LENNOX

Think far*

Installation, operating and maintenance

ENERGY

E019-E027

Air cooled rooftop packaged units

55 → 180 kW

eNeRGy-IOM-1502-E

eNeRGy

Installation, operating and maintenance

Ref : eNeRGy-IOM-1502-E

INSTALLATION MANUAL 3

SERVICE MANUAL 28

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INSTALLATION MANUAL

Ref : eNeRGy-IOM-1502-E

INTRODUCTION

Safety codes & regulations 6

TRANSPORT & HANDLING

Mandatory handling devices 10

LIFTING THE UNITS

Machine dimensions and weights 11

Minimum clearance around the unit installation 17

Lifting the unit with a crane 18

Lifting the roof curbs 19

DELIVERY CHECKS

Rating plate 21

Storage 21

Maintenance access 21

Condensate drains 22

Preliminary checks 22

Installation requirements 22

Connections 22

INSTALLATION ON A ROOF MOUNTING FRAME

Roof opening dimensions 23

Sealing checks 23

Leveling adjustable roofcurbs 23

Positioning the rooftop on adjustable roofcurbs 24

ROOFCURB INSTALLATION

Sealing checks 25

Curbing and flashing 25

DUCT CONNECTIONS 26

HEAT RECOVERY

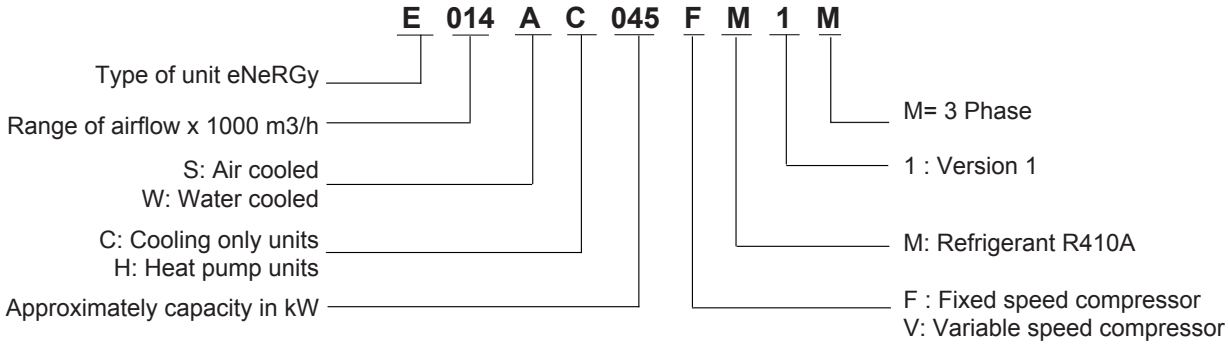
General description 26

Thermodynamic heat recovery - Control 27

Supply horizontal front	HFSU
Supply horizontal back (condensate drain pan side)	HBSU
Horizontal return	HORE
Gravity exhaust damper	GEDD
Vertical power axial fan	PEFA
Vertical extraction EC plug fan	ERVL
High pressure extraction EC plug fan	HPER
Rotary wheel on vertical exhaust air	RWMV
Thermodynamic heat recovery on vertical exhaust air	TRMV
eRecovery on refrigeration equipments	ENRE
EU3 start-up kit (supplied mounted)	FEU3
G4 refillable metallic frame	REU4
G4 + F7	FEU7
G4 + F7 + F9	FEU9
Low ambient condition EC condenser fan	LONO
Compressor acoustic insulation	COJA
Refrigerant leak detection	RLKD
High Pressure EC plug fan	HPEC
Cooling & Heating Water coil - Standard	CHWS
Cooling & Heating Water coil - High	CHWH
Condensing gas burner - Standard - Vertical	GBSV
Condensing gas burner - High - Vertical	GBHV
300 mbar natural gas option	300M
37 mbar propane gas option	PROP
Electrical pre-heater - Standard	EPHS
Electrical pre-heater - Medium	EPHM
Electrical pre-heater - High	EPHH
Electrical heater - Standard	ELHS
Electrical heater - Medium	ELHM
Electrical heater - High	ELHH
LenGuard anti-corrosion condenser coil treatment	BLCO
LenGuard anti-corrosion condenser and evaporator coil treatment	BLCE
LenGuard anti-corrosion evaporator coil treatment	BLEV
LenGuard anti-corrosion water coil treatment (S)	BLWS
LenGuard anti-corrosion water coil treatment (H)	BLWH
LenGuard anti-corrosion thermodynamic recovery condenser and evaporator coil treatment	BLTR
LenGuard anti-corrosion eRecovery coil treatment	BLER

DAD smoke detector	DADS
Fire thermostat	FIRS
CO2 sensor	CO2S
Energy Meter	ELME
Phase control	PHCT
Aluminum wires adaptor	ALWA
Comfort display	DC60
Service display	DS60
Multirooftop display	DM60
Dry Contact Board	DCBO
Advanced control pack (enthalpy and humidity control)	ADCP
LonWorks® interface RS485	ECLO
BACnet® interface RS485	BNET
ModBus interface RS485	MBUS
ModBus and BACnet® interface TCP/IP	MBIP
Non Adjustable insulated roofcurb 1	NAR1
Non Adjustable insulated roofcurb 2	NAR2
Non Adjustable insulated roofcurb 3	NAR3
Non Adjustable insulated roofcurb 4	NAR4
Adjustable insulated roofcurb 1	ADR1
Adjustable insulated roofcurb 2	ADR2
Adjustable insulated roofcurb 3	ADR3
Adjustable insulated roofcurb 4	ADR4
Container packing including wooden blocks and film	PACK
Control supply pressure pressostat	PCPS
Electrical box fan motor	EBFM

The present manual applies to the following units


E 014 A C 045 F M 1 M
Type of unit eNeRGy
Range of airflow x 1000 m3/h
S: Air cooled
W: Water cooled
C: Cooling only units
H: Heat pump units
Approximately capacity in kW
M= 3 Phase
1 : Version 1
M: Refrigerant R410A
F : Fixed speed compressor
V: Variable speed compressor

Size	Minimum airflow (m^3/h)	Nominal airflow (m^3/h)	Maximum airflow (m^3/h)	Net cooling capacity	Input power	EER	EER Class	Net heating capacity	Input power	COP	COP Class
E014AC055	9500	13500	16000	52,34	15,44	3,39	A				
E014AC065	9500	13500	24000	65,96	21,03	3,14	A				
E019AC066	13000	18900	20000	70,58	22,81	3,09	A				
E014AC075	9500	13500	24000	70,99	22,92	3,10	A				
E019AC076	13000	18900	24000	76,11	24,76	3,07	A				
E016AC085	10500	15500	24000	82,06	26,77	3,07	A				
E019AC086	13000	18900	24000	88,05	28,14	3,13	A				
E016AC105	10500	15500	24000	98,02	32,56	3,01	A				
E019AC106	13000	18900	24000	106,01	34,95	3,03	A				
E019AC124	13000	18900	24000	114,20	37,71	3,03	A				
E022AC077	15000	21600	24000	67,46	20,56	3,28	A				
E024AC078	17000	24300	28000	72,82	20,32	3,58	A				
E022AC087	15000	21600	24000	87,22	27,46	3,18	A				
E024AC088	17000	24300	28000	91,91	27,82	3,30	A				
E022AC107	15000	21600	24000	107,76	35,65	3,02	A				
E024AC108	17000	24300	32000	112,90	36,55	3,09	A				
E024AC126	17000	24300	32000	119,95	38,68	3,10	A				
E022AC140	15000	21600	24000	131,84	43,74	3,01	A				
E024AC141	17000	24300	32000	140,53	46,45	3,03	A				
E027AC160	18500	27000	32000	154,64	51,33	3,01	A				
E027AC180	18500	27000	32000	180,59	60,03	3,01	A				
E014AH055	9500	13500	16000	52,34	15,44	3,39	A	49,65	12,29	4,04	A
E014AH065	9500	13500	24000	65,96	21,03	3,14	A	65,321	19,075	3,424	A
E019AH066	13000	18900	20000	70,58	22,81	3,09	A	67,784	19,290	3,514	A
E014AH075	9500	13500	24000	70,99	22,92	3,10	A	69,053	20,296	3,402	A
E019AH076	13000	18900	24000	76,11	24,76	3,07	A	72,757	20,307	3,583	A
E016AH085	10500	15500	24000	82,06	26,77	3,07	A	83,714	24,516	3,415	A
E019AH086	13000	18900	24000	88,05	28,14	3,13	A	86,248	25,186	3,425	A
E016AH105	10500	15500	24000	98,02	32,56	3,01	A	106,749	33,306	3,205	B
E019AH106	13000	18900	24000	106,01	34,95	3,03	A	107,272	31,450	3,411	A
E019AH124	13000	18900	24000	114,20	37,71	3,03	A	119,358	34,957	3,414	A
E022AH077	15000	21600	24000	67,46	20,56	3,28	A	65,265	16,478	3,961	A
E024AH078	17000	24300	28000	72,82	20,32	3,58	A	63,455	16,253	3,904	A
E022AH087	15000	21600	24000	87,22	27,46	3,18	A	86,045	23,623	3,642	A
E024AH088	17000	24300	28000	91,91	27,82	3,30	A	87,145	23,214	3,754	A
E022AH107	15000	21600	24000	107,76	35,65	3,02	A	108,459	31,710	3,420	A
E024AH108	17000	24300	32000	112,90	36,55	3,09	A	108,265	31,296	3,459	A
E024AH126	17000	24300	32000	119,95	38,68	3,10	A	117,023	33,405	3,503	A
E022AH140	15000	21600	24000	131,84	43,74	3,01	A	140,737	43,817	3,212	B
E024AH141	17000	24300	32000	140,53	46,45	3,03	A	141,559	43,713	3,238	B
E027AH160	18500	27000	32000	154,64	51,33	3,01	A	158,509	49,259	3,218	B
E027AH180	18500	27000	32000	180,59	60,03	3,01	A	179,474	59,528	3,015	C

Safety codes & regulations

THE UNIT MUST BE INSTALLED IN ACCORDANCE WITH LOCAL SAFETY CODES AND REGULATIONS AND CAN ONLY BE USED IN WELL VENTILLATED AREA.
PLEASE READ CAREFULLY THE MANUFACTURER'S INSTRUCTIONS BEFORE STARTING THIS UNIT.

INSPECTIONS AND REQUALIFICATION ACCORDING PRESSURE EQUIPMENT DIRECTIVE MUST FOLLOW THE LOCAL REGULATIONS WHERE THE UNIT IS INSTALLED.

All units are compliant with the PED directive 97-23/CE

EMC DIRECTIVE COMPLIANCE

WARNING:

This equipment is an "B class" according CEM Directive.
The units meet the following hardest environments norms:
EN 61000-6-3: program for environment residential, commercial and light industry.
EN 61000-6-2: immunity for industrial environments.

In emission devices having a rated current I < 75A:
- For machines with Compressor with variable speed, the short-circuit ratio Rsce is: 120 (EN 61000-3-12)
- For machines without variable speed compressor, the short-circuit ratio Rsce is: 66 (EN 61000-3-12)
- The permissible maximum impedance of network Zmax is: 0.17 (EN 61000-3-11).

The differences between the various machines are only related to the power of the compressors and equipment that there are associated. For conducted and radiated emission and immunity, these differences do not alter the results.

F-Gas REGULATION

EC Regulation No 842/2006 on fluorinated greenhouse gases

Operators of refrigeration equipments must comply with the 6 main obligations defined in the F Gas Regulation

OBLIGATION	APPLICABILITY
Recovery of F gases during plant servicing and maintenance and at the end of plant life.	All stationary systems
Use adequately trained staff to carry out installation, servicing and maintenance and leakage checking.	All stationary systems
NEW equipment shall be labelled.	All stationary systems
Take steps to prevent F gas leakage and repair detected leakage as soon as possible.	All stationary systems
Regularly check for leakage. 06 kg or more : at least once every 12 months 30 kg or more : at least once every 6 months 300 kg or more : at least once every 3 months	Hermetically sealed systems > 6kg
Keep certain records about refrigeration plant that uses F gases. (refer to the start up and Maintenance Log book at the end of this document)	Stationary systems > 3kg
Fit and check automatic leak detection system.	Stationary systems > 300kg

Non compliance with these requirements is an offence and liable of financial penalties.

Moreover, in case of problem it is mandatory to prove to the insurance company that the equipment complies with the F gas Regulation.

WARRANTY

The warranty of the unit is subject to the warranty definitions as agreed upon in the order.
It is expected that the design and installation of the unit utilises good working practices.
The warranty will be legally null and void if:

- ***Service and maintenance have not been executed in accordance with the regulations; repairs have not been carried out by LENNOX personnel or have been implemented without prior written permission by LENNOX.***
- ***Modifications have been made to the equipment without prior written permission by LENNOX.***
- ***Settings and protections have been modified without prior written permission by LENNOX.***
- ***Non-original or other than the prescribed refrigerants or lubricants are used.***
- ***The equipment has not been installed and/or connected in accordance with the installation instructions.***
- ***The equipment is being used improperly, incorrectly, negligently or not in accordance with its nature and/or purpose.***
- ***A flow protection device is not fitted.***

In these circumstances LENNOX is indemnified from any product liability claims from third parties.
In the event of a warranty claim the machine serial number and LENNOX order number must be quoted.

WARNING - All the technical and technological information contained in this manual, including any drawing and technical descriptions provided by us, remain the property of LENNOX and must not be utilised (except in operation of this product),reproduced, issued to or made available to third parties without the prior written agreement of LENNOX. The technical information and specifications contained in this manual are for reference only. The manufacturer reserves the right to modify these without warning and without obligation to modify equipment already sold.

SAFETY

The safety information contained in this manual is provided as a guide for the safe handling of this installation. LENNOX does not vouch for the completeness of this information and can therefore not accept liability for any possible omissions.
In the roof tops, heat is being transported by a pressurised refrigerant, with changes in pressure and temperature. For air cooled roof tops, fans have been provided to discharge heat into the environment. The protection of operating and maintenance personnel was central in the design of the roof top. Safety features have been included to prevent excessive pressure in the system. Sheet metal parts have been fitted to prevent inadvertent contact with (hot) pipes. For air cooled roof tops, the fans are equipped with protective grids and the electrical control panel is completely touch-proof. This excludes some parts operating at a safe voltage (< 24 Volt). The service panels can only be opened using tools.
The electrical control panel is completely touch-proof. This excludes some parts operating at a safe voltage (< 50 Volt). The service panels can only be opened using tools.

Notwithstanding that the roof tops are equipped with extensive safety and protection features, the utmost care and attention is needed when carrying out operations on the machine. Furthermore, ear protection should be worn when working on or in the vicinity of the roof tops. Operations on the cooling circuit or electrical equipment should be carried out by authorised personnel.

It is essential to follow non exhaustive recommendations hereunder:
- Never work on a unit that is still energized.
- Any manipulation (opening or closing) of a shut-off valve must be carried out by a qualified and authorised engineer. These procedures must be carried out with the unit shut-down.
- Never work on any of the electrical components, until the general power supply to the unit has been cut. During any maintenance operations on the unit, lock the power supply circuit in the open position ahead of the machine. If the work is interrupted, check the lock before resuming the work.
  WARNING: Even if the unit has been switched off, the power circuit remains energized, unless the unit or circuit disconnect switch is open. Refer to the wiring diagram for further details.
- For some units, a separate 220V power supply may exist, check the electrical wiring for more informations
- In case of maintenance operations on fans (grills replacement …) ensure that the power is shut off to avoid automatic restart.
- Before the opening of the refrigerant circuit, check the pressure with manometers or pressure sensors.
- Never leave a unit stopped with valves closed on the liquid line, refrigerant could be trapped and the pressure would rise.
- All installation parts must be maintained by the personnel in charge, in order to avoid material deterioration and injuries to people. Faults and leaks must be repaired immediately. The authorized technician must have the responsibility to repair the fault immediately. Each time repairs have been carried out to the unit, the operation of the safety devices must be re-checked.
- Follow guidance and recommendations given in safety and machine standards such as EN378, ISO5149, etc
- Do not use oxygen to purge lines or to pressurize a machine for any purpose. Oxygen gas reacts violently with oil, grease, and other common substances.
- Never exceed the specified maximum operating pressures. Verify the allowable maximum high- and low-side test pressures by checking the instructions in this manual and the pressures given on the unit name plate.
- Do not use air for leak testing. Use only refrigerant or dry nitrogen.
- Do not unweld or flame cut the refrigerant lines or any refrigerant circuit component until all refrigerant (liquid and vapour) has been removed from roof top. Traces of vapour should be displaced with dry air nitrogen. Refrigerant in contact with an open flame produces toxic gases.
- Do not siphon refrigerant
- Avoid spilling liquid refrigerant on skin or splashing it into the eyes. Use safety goggles. Wash any spills from the skin with soap and water. If liquid refrigerant enters the eyes, immediately and abundantly flush the eyes with water and consult a doctor.

Safety definition

The roof tops meet the following safety definitions:
- Pr-EN-378-1.
- 2006/42/CE (“Machine Directive”).
- EN-60204-1.
- 2004/108/CE “EMC Directive”.
- Pressure Equipment Directive 97/23/CE.
- Gaz equipment Directive 90/396/CEE

And is provided with CE markings (on the condition that the necessary options are present) (for further information see CE declaration).

Warning labels

The roof top is marked with the following warning labels to alert to potential hazards (on or near the potentially hazardous part).

High temperatures	Electrical Voltage	Rotating parts	Sharp parts

Regularly check that the warning labels are still in the correct positions on the machine and replace them if necessary.

The following note must be followed carefully

Main Safety Recommendations

All work on the unit must be carried out by a qualified and authorised employee.

Non-compliance with the following instructions may result in injury or serious accidents.

Work on the unit:
- The unit shall be isolated from the electrical supply by disconnection and locking using the main isolating switch.
- Workers shall wear the appropriate personal protective equipment (helmet, gloves, glasses, etc.).

Work on the electrical system:
- Work on electric components shall be performed with the power off (see below) by employees having valid electrical qualification and authorisation.

Work on the refrigerating circuit(s):
- Monitoring of the pressures, draining and filling of the system under pressure shall be carried out using connections provided for this purpose and suitable equipment.
- To prevent the risk of explosion due to spraying of coolant and oil, the relevant circuit shall be drained and at zero pressure before any disassembly or unbrazing of the refrigerating parts takes place.
- There is a residual risk of pressure build-up by degassing the oil or by heating the exchangers after the circuit has been drained. Zero pressure shall be maintained by venting the drain connection to the atmosphere on the low pressure side.
- The brazing shall be carried out by a qualified brazier. The brazing shall comply with standard NF EN1044 (minimum 30% silver).

Replacing components:
- In order to maintain CE markisng compliance, replacement of components shall be carried out using spare parts, or using parts approved by LENNOX.
- Only the coolant shown on the manufacturer's nameplate shall be used, to the exclusion of all other products (mix of coolants, hydrocarbons, etc.).

CAUTION:
In the event of fire, refrigerating circuits can cause an explosion and spray coolant gas and oil.

Transport – Handling- Access:
- Never lift the unit without forklift protections
- An approach ramp must be installed if the unit's installation requirements tell that it's necessary to reach the main switch, the electrical cabinet, the compressor and the ventilation compartment. This recommendation is valid for all type of installations.
- It is strictly forbidden to walk or store equipment or material on top of the rooftop unit

Rooftop installation in heavy wind locations
- The roofcurbs (vertical & horizontal) and rooftops installations are designed to withstand winds up to 80 km/h. Above this limit, it's recommended to take appropriate actions to secure the installation.
- Ensure the fresh air inlet does not face prevailing wind direction.

Filters:
- Do the filters fire classification's choice according to local regulations.

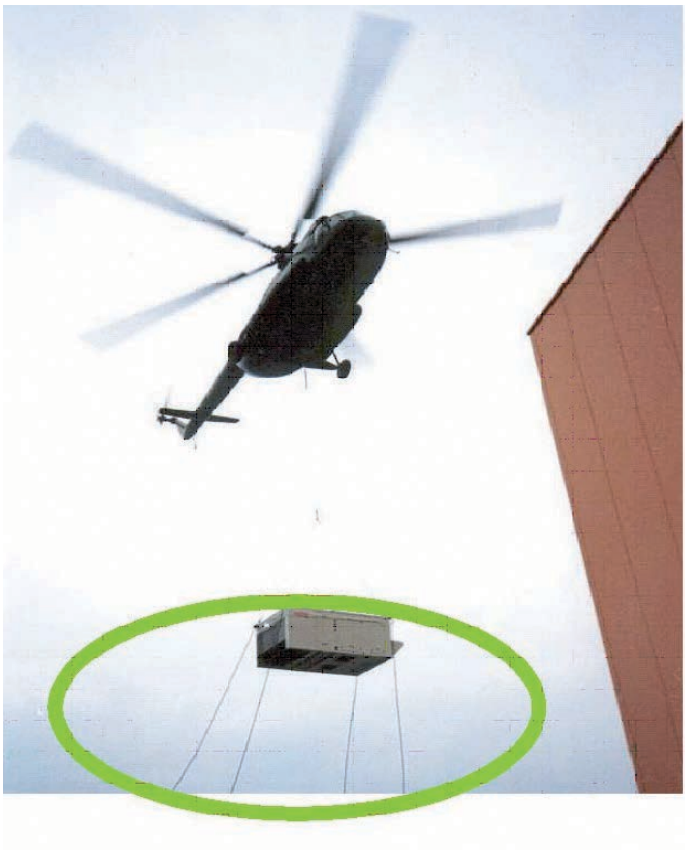
Fan compartment:
- Stop the power before accessing the fan compartment.

Gas:
- Any work on gas module must be carried out by qualified personnel
- A unit with gas module must be installed in accordance with local safety codes and regulations and can only be used for outdoor installation.

Mandatory handling devices

MANDATORY HANDLING DEVICES

Handling slings to guide the unit toward the roof curb



Vacuum lifting beam to position the unit

COMPLIANT

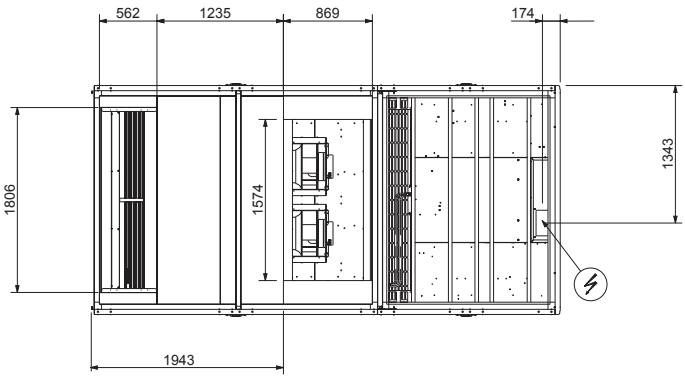
NON-COMPLIANT

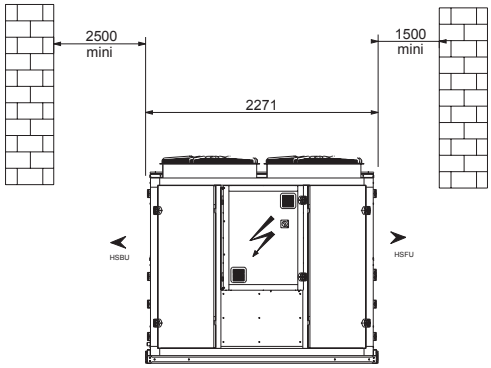
Dimensions and weights

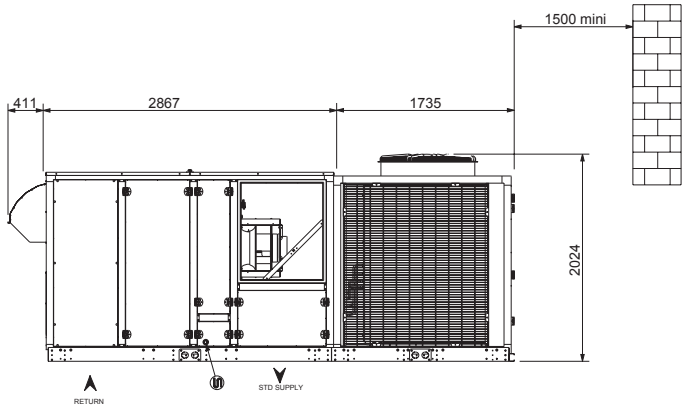
		E019NN000NN1M	E022NN000NN1M	E027NN000NN1M	E014AH055FM1M	E014AH065FM1M	E014AH075FM1M	E016AH085FM1M	E016AH105FM1M	E019AH066FM1M	E019AH076FM1M	E019AH086FM1M	E019AH106FM1M	E019AH124FM1M
LENGTH	Base unit Heat pump	3177	3117	3117	4602	4602	4602	4602	4602	4602	4602	4602	4602	4602
	Fresh air hood (open)	581	581	581	581	581	581	581	581	581	581	581	581	581
	Vertical extraction EC plug fan	965	965	965	965	965	965	965	965	965	965	965	965	965
	Rotary wheel on vertical exhaust air	876	876	876	876	876	876	876	876	876	876	876	876	876
	Thermodynamic heat recovery on vertical exhaust air	876	876	876	876	876	876	876	876	876	876	876	876	876
	Condensing gas burner High Vertical	0	235	235	0	0	0	0	0	0	0	0	0	0
WIDTH	Base unit	2277	2277	2277	2271	2271	2271	2271	2271	2271	2271	2271	2271	2271
HEIGHT	Base unit Heat pump	1868	2275	2275	1868	1868	2204	2204	2204	1868	2204	2204	2204	2204
	Rotary wheel on vertical exhaust air	405	0	0	405	405	405	405	405	405	405	405	405	405

		E022AH077FM1M	E022AH087FM1M	E022AH107FM1M	E022AH140FM1M	E024AH078FM1M	E024AH088FM1M	E024AH108FM1M	E024AH126FM1M	E024AH141FM1M	E027AH160FM1M	E027AH180FM1M
LENGTH	Base unit Heat pump	4602	4602	4602	5203	4602	4602	4602	4602	5203	5203	5203
	Fresh Air Hood Open	581	581	581	581	581	581	581	581	581	581	581
	Extraction EC plug Fan vertical	965	965	965	965	965	965	965	965	965	965	965
	Rotary wheel on vertical exhaust air	876	876	876	876	876	876	876	876	876	876	876
	Thermodynamic heat recovery on vertical exhaust air	876	876	876	876	876	876	876	876	876	876	876
	Condensing gas burner High Vertical	235	235	235	235	235	235	235	235	235	235	235
WIDTH	Base unit	2271	2271	2271	2271	2271	2271	2271	2271	2271	2271	2271
HEIGHT	Base unit Heat pump	2273	2273	2273	2273	2273	2273	2273	2273	2273	2273	2273
	Rotary wheel on vertical exhaust air	0	0	0	0	0	0	0	0	0	0	0

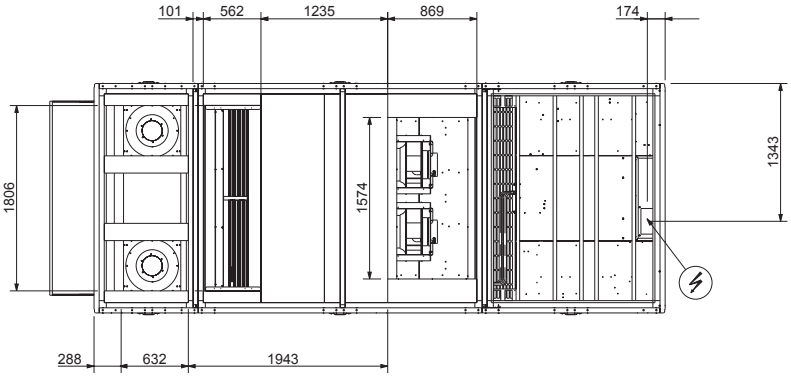
E014-E019

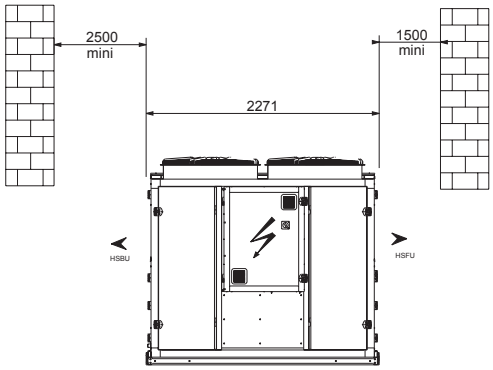


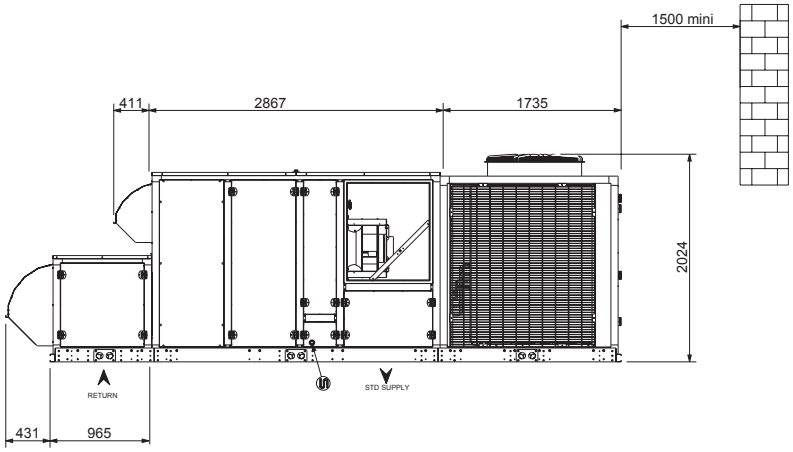




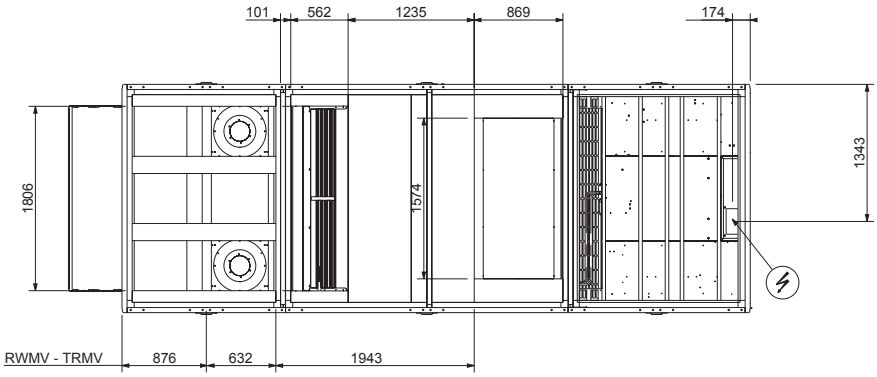
E014-E019 + EXTRACTION

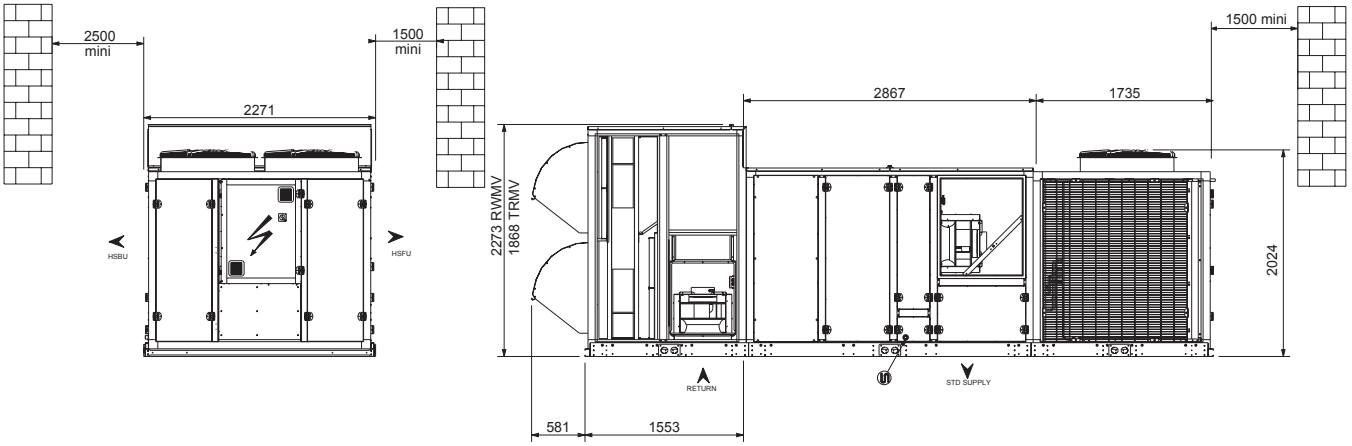




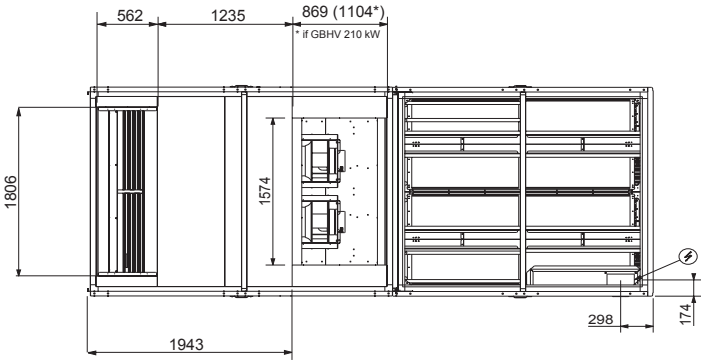


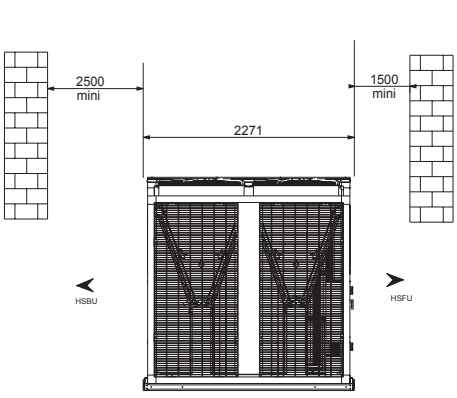
E014-E019 + EXTRACTION + ROTARY WHEEL or TRMO

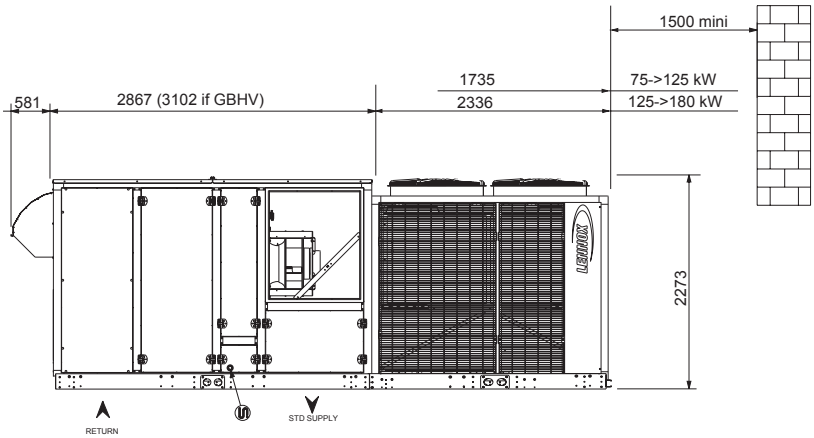




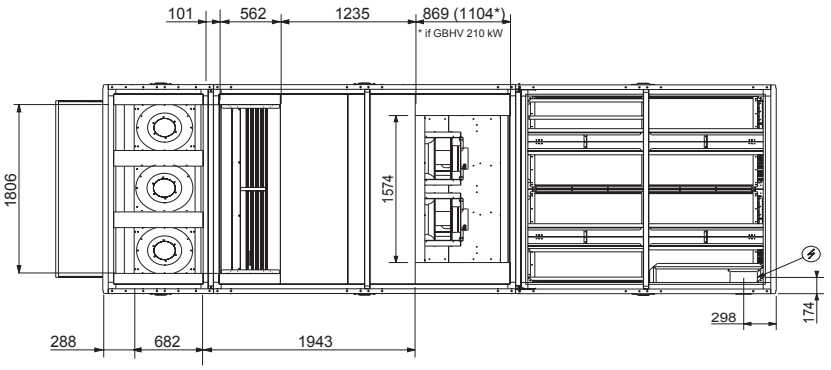
E022-E027

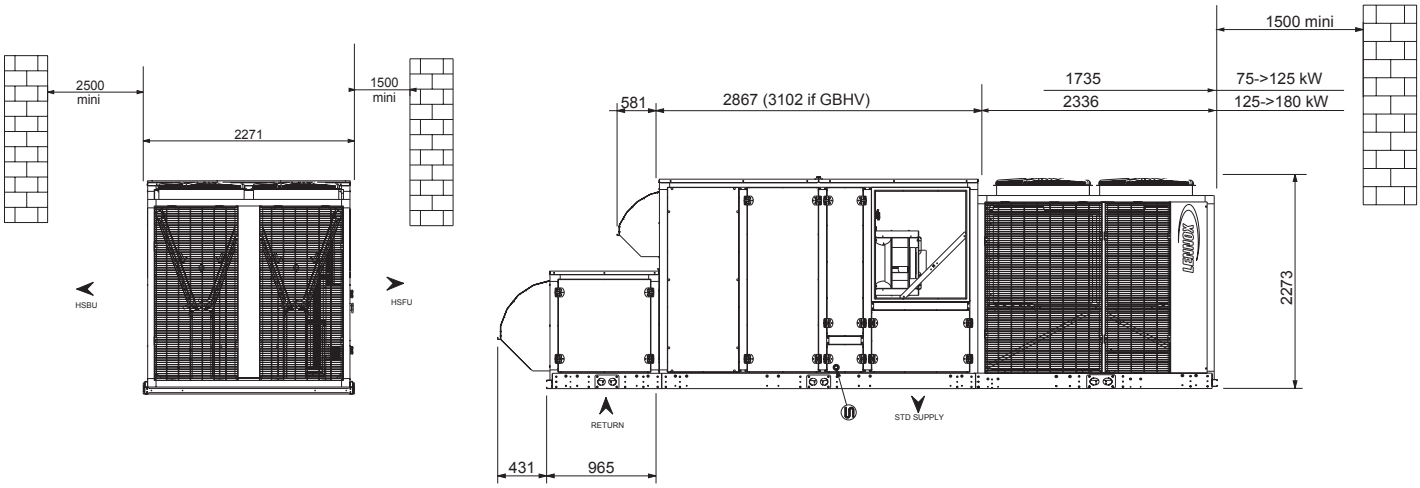




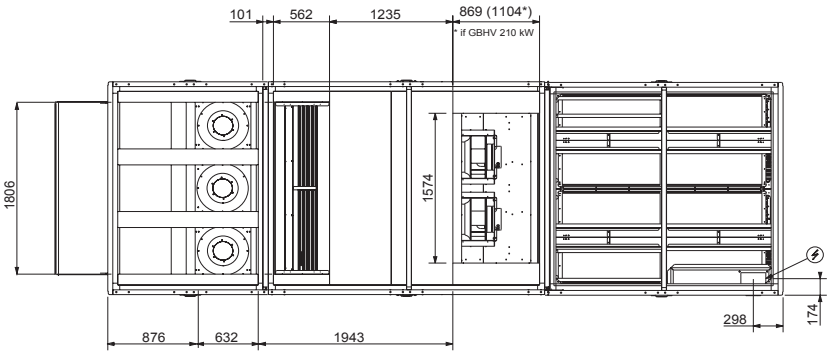


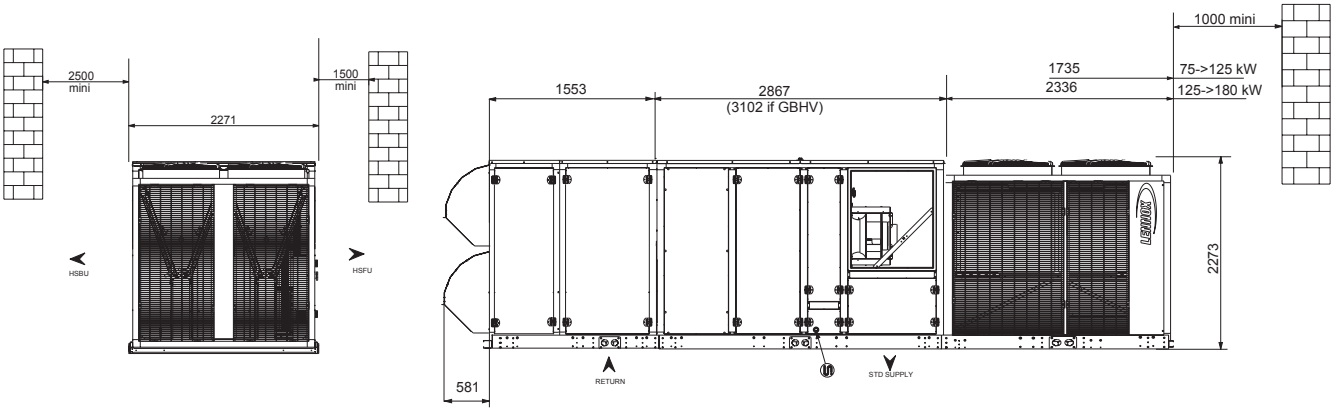
E022-E027 + EXTRACTION





E022-E027 + EXTRACTION + ROTARY WHEEL or TRMO





WEIGHT (Kg)	E019 NN000NN	E022 NN000NN	E027 NN000NN	E014--055F	E014--065F	E014--075F	E016--085F	E016--105F	E019--066F	E019--076F	E019--086F	E019--106F	E019--124F
Base unit - Cooling mode	458	507	606	1457	1521	1599	1609	1643	1542	1614	1624	1668	1664
Base Unit - Heating mode				1452	1516	1582	1592	1625	1537	1599	1610	1653	1648
Air flow Configuration													
Supply horizontal front	15	5	5	15	15	15	15	15	15	15	15	15	15
Supply horizontal back (condensate drain pan side)	15	5	5	15	15	15	15	15	15	15	15	15	15
Horizontal return (in-line)	8	7	7	8	8	8	8	8	8	8	8	8	8
High Pressure EC Plug Fan	10	10	15	10	10	10	10	10	10	10	10	10	10
Exhaust Air Options													
Gravity exhaust damper	6	10	10	6	6	6	6	6	6	6	6	6	6
Power axial fan vertical	42	44	44	42	42	42	42	42	42	42	42	42	42
Extraction EC plug Fan vertical	313	313	363	313	313	313	313	313	313	313	313	313	313
Extraction EC plug Fan horizontal (from top)	391	391	454	391	391	391	391	391	391	391	391	391	391
Extraction EC plug fan high pressure	10	10	15	10	10	10	10	10	10	10	10	10	10
Recovery Options													
Rotary wheel on vertical exhaust air	564	548	548	564	564	564	564	564	564	564	564	564	564
Rotary wheel on horizontal exhaust air	564	548	548	564	564	564	564	564	564	564	564	564	564
Thermodynamic heat recovery on vertical exhaust air	338	413	413	338	338	338	338	338	338	338	338	338	338
Thermodynamic heat recovery on horizontal exhaust air	406	496	496	406	406	406	406	406	406	406	406	406	406
eRecovery on refrigeration equipments	45	57	57	45	45	45	45	45	45	45	45	45	45
Filtration													
EU3 start-up kit (supplied loose)	5	7	7	5	5	5	5	5	5	5	5	5	5
G4 refilable metalic frame	0	0	0	0	0	0	0	0	0	0	0	0	0
G4 + F7	40	51	51	40	40	40	40	40	40	40	40	40	40
G4 + F7 + F9	97	122	122	97	97	97	97	97	97	97	97	97	97
Heating and Cooling Options													
Cooling & Heating Water coil Standard	26	32	32	26	26	26	26	26	26	26	26	26	26
Cooling & Heating Water coil High	43	54	54	43	43	43	43	43	43	43	43	43	43
Condensing gas burner Standard Vertical	102	122	122	102	102	102	102	102	102	102	102	102	102
Condensing gas burner Standard Horizontal	377	442	442	377	377	377	377	377	377	377	377	377	377
Condensing gas burner High Vertical	122	265	265	122	122	122	122	122	122	122	122	122	122
Condensing gas burner High Horizontal	397	585	585	397	397	397	397	397	397	397	397	397	397
Electrical pre-heater Standard	41	106	106	41	41	41	41	41	41	41	41	41	41
Electrical pre-heater Medium	68	131	131	68	68	68	68	68	68	68	68	68	68
Electrical pre-heater High	76	148	148	76	76	76	76	76	76	76	76	76	76
Electrical heater Standard	41	106	106	41	41	41	41	41	41	41	41	41	41
Electrical heater Medium	68	131	131	68	68	68	68	68	68	68	68	68	68
Electrical heater High	76	148	148	76	76	76	76	76	76	76	76	76	76
Others Options													
Non Adjustable roofcurb insulated 1	156	156	156	251	251	251	251	251	251	251	251	251	251
Non Adjustable roofcurb insulated 2	-	161	161	-	-	-	-	-	-	-	-	-	-
Non Adjustable roofcurb insulated 3	186	186	186	281	281	281	281	281	281	281	281	281	281
Non Adjustable roofcurb insulated 4	-	194	194	-	-	-	-	-	-	-	-	-	-
Adjustable roofcurb insulated 1	234	234	234	353	353	353	353	353	353	353	353	353	353
Adjustable roofcurb insulated 2	-	243	243	-	-	-	-	-	-	-	-	-	-
Adjustable roofcurb insulated 3	281	281	281	401	401	401	401	401	401	401	401	401	401
Adjustable roofcurb insulated 4	-	293	293	-	-	-	-	-	-	-	-	-	-
Container packing including skates and film	400	400	400	400	400	400	400	400	400	400	400	400	400

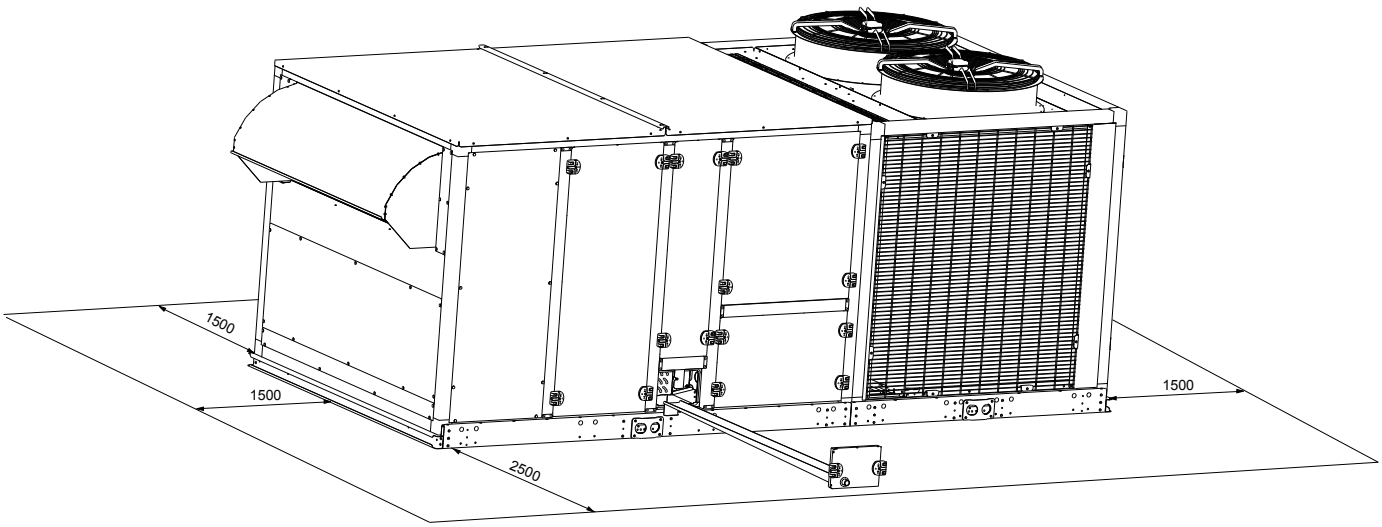
WEIGHT (Kg)	E022--077F	E022--087F	E022--107F	E022--140F	E024--078F	E024--088F	E024--108F	E024--126F	E024--141F	E027--160F	E027--180F
Base unit - Cooling mode	1629	1700	1755	2052	1688	1760	1816	2050	2138	2191	2211
Base Unit - Heating mode	1615	1686	1740	2030	1683	1754	1810	2030	2118	2170	2189
Air flow Configuration											
Supply horizontal front	5	5	5	5	5	5	5	5	5	5	5
Supply horizontal back (condensate drain pan side)	5	5	5	5	5	5	5	5	5	5	5
Horizontal return (in-line)	7	7	7	7	7	7	7	7	7	7	7
High Pressure EC Plug Fan	10	10	10	10	15	15	15	15	15	15	15
Exhaust Air Options											
Gravity exhaust damper	10	10	10	10	10	10	10	10	10	10	10
Power axial fan vertical	44	44	44	44	44	44	44	44	44	44	44
Extraction EC plug Fan vertical	313	313	313	313	363	363	363	363	363	363	363
Extraction EC plug Fan horizontal (from top)	391	391	391	391	454	454	454	454	454	454	454
Extraction EC plug fan high pressure	10	10	10	10	15	15	15	15	15	15	15
Recovery Options											
Rotary wheel on vertical exhaust air	548	548	548	548	548	548	548	548	548	548	548
Rotary wheel on horizontal exhaust air	548	548	548	548	548	548	548	548	548	548	548
Thermodynamic heat recovery on vertical exhaust air	413	413	413	413	413	413	413	413	413	413	413
Thermodynamic heat recovery on horizontal exhaust air	496	496	496	496	496	496	496	496	496	496	496
eRecovery on refrigeration equipments	57	57	57	57	57	57	57	57	57	57	57
Filtration											
EU3 start-up kit (supplied loose)	7	7	7	7	7	7	7	7	7	7	7
G4 refilable metalic frame	0	0	0	0	0	0	0	0	0	0	0
G4 + F7	51	51	51	51	51	51	51	51	51	51	51
G4 + F7 + F9	122	122	122	122	122	122	122	122	122	122	122
Heating and Cooling Options											
Cooling & Heating Water coil Standard	32	32	32	32	32	32	32	32	32	32	32
Cooling & Heating Water coil High	54	54	54	54	54	54	54	54	54	54	54
Condensing gas burner Standard Vertical	122	122	122	122	122	122	122	122	122	122	122
Condensing gas burner Standard Horizontal	442	442	442	442	442	442	442	442	442	442	442
Condensing gas burner High Vertical	265	265	265	265	265	265	265	265	265	265	265
Condensing gas burner High Horizontal	585	585	585	585	585	585	585	585	585	585	585
Electrical pre-heater Standard	106	106	106	106	106	106	106	106	106	106	106
Electrical pre-heater Medium	131	131	131	131	131	131	131	131	131	131	131
Electrical pre-heater High	148	148	148	148	148	148	148	148	148	148	148
Electrical heater Standard	106	106	106	106	106	106	106	106	106	106	106
Electrical heater Medium	131	131	131	131	131	131	131	131	131	131	131
Electrical heater High	148	148	148	148	148	148	148	148	148	148	148
Others Options											
Non Adjustable roofcurb insulated 1	251	251	251	280	251	251	251	280	280	280	280
Non Adjustable roofcurb insulated 2	257	257	257	286	257	257	257	286	286	286	286
Non Adjustable roofcurb insulated 3	281	281	281	310	281	281	281	310	310	310	310
Non Adjustable roofcurb insulated 4	286	286	286	315	286	286	286	315	315	315	315
Adjustable roofcurb insulated 1	353	353	353	392	353	353	353	392	392	392	392
Adjustable roofcurb insulated 2	363	363	363	401	363	363	363	401	401	401	401
Adjustable roofcurb insulated 3	401	401	401	439	401	401	401	439	439	439	439
Adjustable roofcurb insulated 4	409	409	409	448	409	409	409	448	448	448	448
Container packing including skates and film	400	400	400	400	400	400	400	400	400	400	400

Minimum clearance around the unit installation

Figure below show the required clearances and service access around the unit.

IMPORTANT note for unit clearances

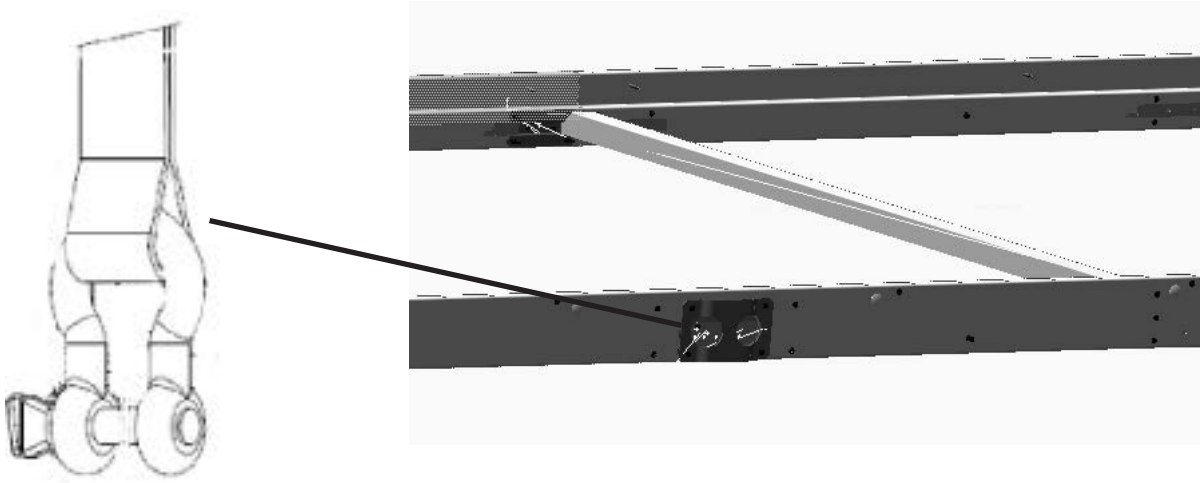
- Ensure the fresh air inlet does not face prevailing wind direction.
- If machine is including gas burner, minimum clearance around the unit must be at least 8 m to allow a proper gas flue dilution. If not possible, the fresh air intake must be ducted at least 8 m away from the gas burner exhaust.
- In case of extraction option, it is recommended to duct fresh air intake.



Lifting the unit with a crane

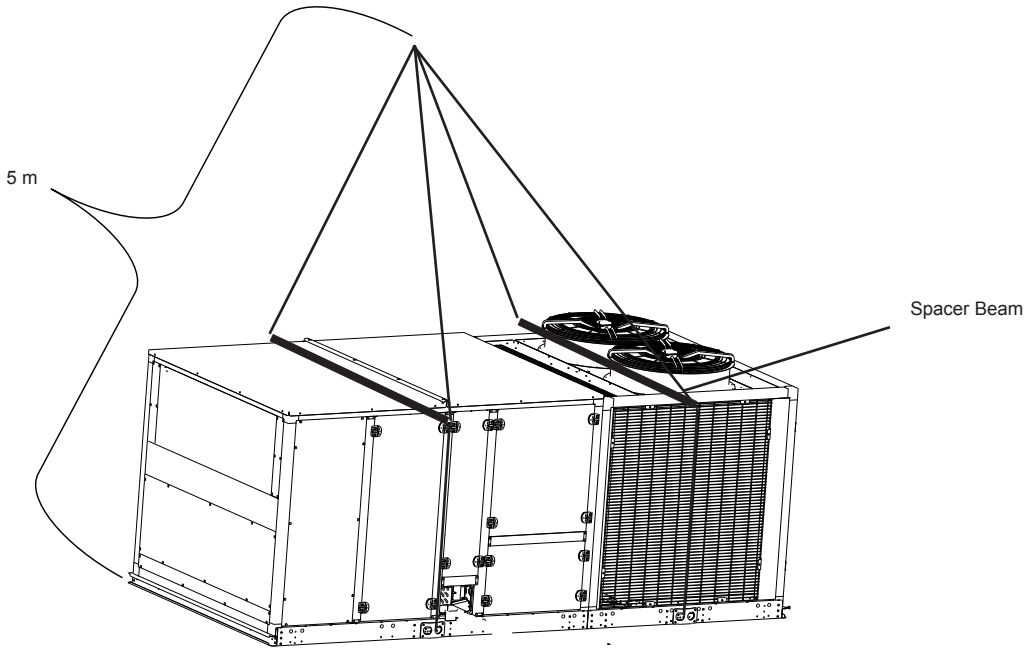
Lifting lug dimensions

Use lifting shackles located in the unit. Maximum diameter of the ring shaft = 20 mm.



Lifting belts length

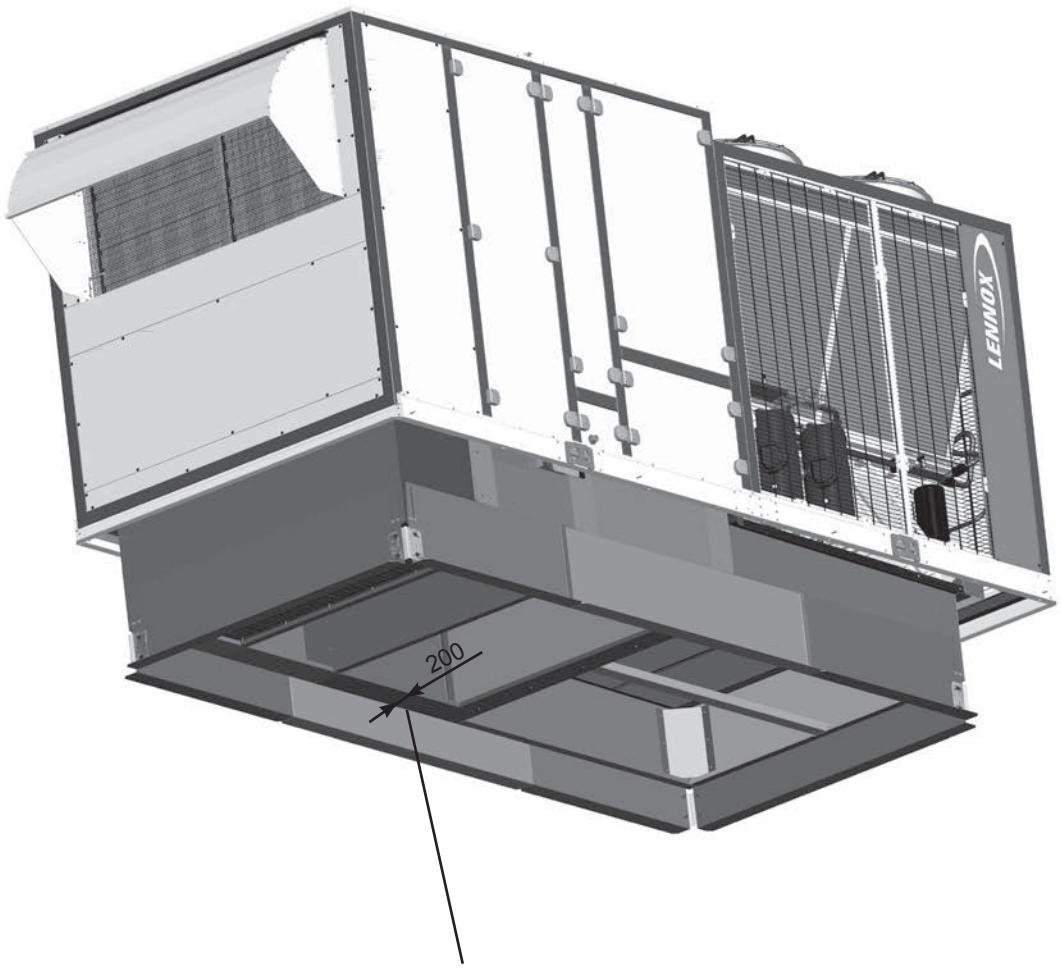
The unit must be lifted using spacing beams to avoid the belts damages to the casing.
Spacing beams must have a length equal to the machine width – i.e 2250 mm.



Lifting the roof curbs

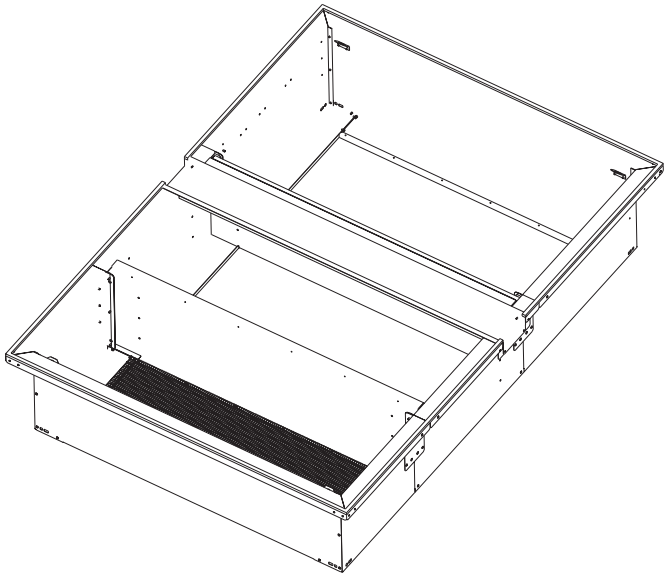
Ducting connection details

The supply and return air ducts can be secured to the 30 mm flanges at the bottom of the roofcurb
Any ducting weight above 100 kg must be fixed independently to other building frames.

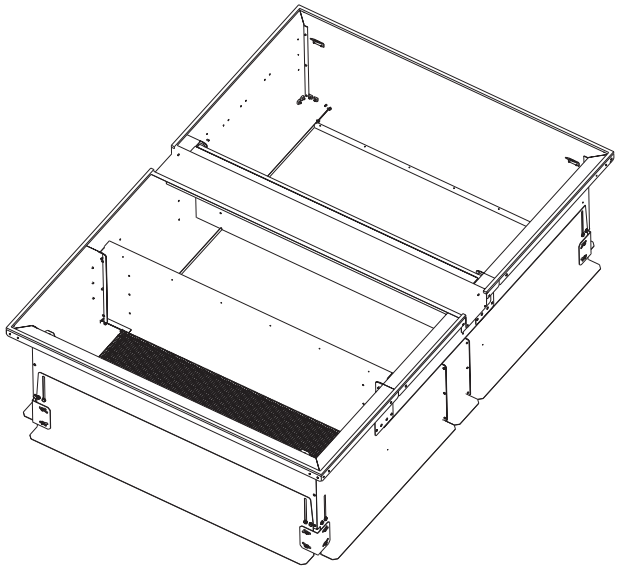


Distance for duct connection: 150 mm

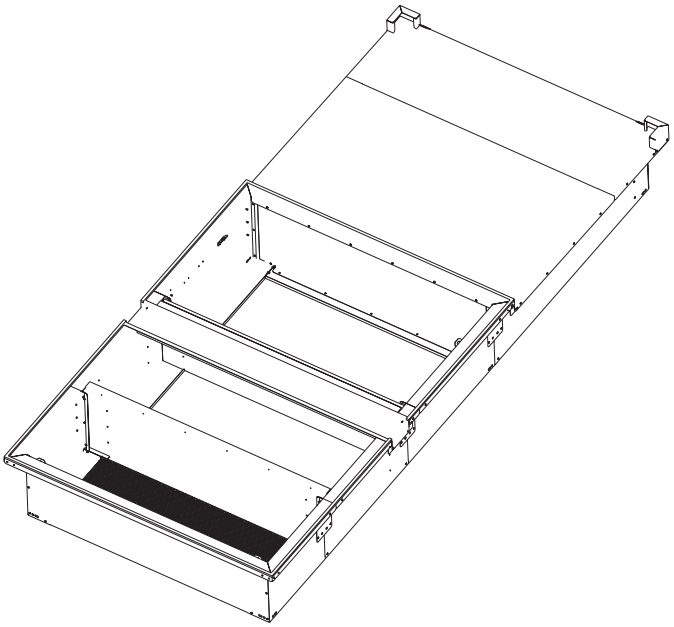
Non adjustable roofcurb without condensing unit



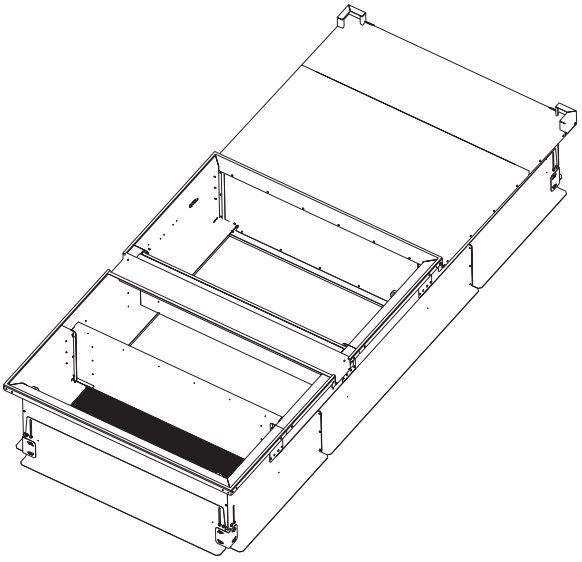
Adjustable roofcurb without condensing unit



Non adjustable roofcurb with condensing unit



Adjustable roofcurb with condensing unit



WARNING : all the roofcurb must be secured to the ground using existing fixing holes on the frame.

On receipt of new equipment please check the following points.
It is the customer's responsibility to ensure that the products are in good working order:

- The exterior has not been damaged in any way.
- The lifting and handling equipment are suitable for the equipment and comply with the specifications of the handling instructions enclosed here-in.
- Accessories ordered for on site installation have been delivered and are in good working order.
- The equipment supplied corresponds to the order and matches the delivery note.

If the product is damaged, exact details must be confirmed in writing by registered post to the shipping company within 48 hours of delivery (working days). A copy of the letter must be addressed to LENNOX and the supplier or distributor for information purposes. Failure to comply will invalidate any claim against the shipping company.

Rating plate

The rating plate provides a complete reference for the model and ensures that the unit corresponds to the model ordered. It states the electrical power consumption of the unit on start-up, its rated power and its supply voltage. The supply voltage must not deviate beyond +10/-15 %. The start-up power is the maximum value likely to be achieved for the specified operational voltage. The customer must have a suitable electrical supply. It is therefore important to check whether the supply voltage stated on the unit's rating plate is compatible with that of the mains electrical supply. The rating plate also states the year of manufacture as well as the type of refrigerant used and the required charge for each compressor circuit.

LENNOX LGL France SAS CE 0038

Type unité:E027AH180FM1M

N° de série : 281957_1 1/2

	Voltage (V)	Phase (Ph)	Fréquence (Hz)	Intensité (A)	
V alim.	400	3	50	Nominal	Démarrag
V com.	24	1	50	424,4	509,9

	Min		Max	
	BP	HP	BP	HP
Pression (PS) (bar)	-1	-1	29,5	42
Température (TS) (°C)	-20	-20	50	110
Température de stockage (°C)	-30		50	

BP: côté basse pression / HP: côté haute pression

Puissance (kW)		Charge de refrigerant (kg)				Dates	
Froid	Chaud	C1	C2	C3	C4	Prod.	Test
177	174	20	20	0	0	2014	13/11/2014

Fluide	Groupe fluide	Poids (kg) +/-5%
R410A	2	2912

Ce produit est utilisé pour conditionnement d'air. Contient des gaz à effet de serre fluorés visés par le protocole de Kyoto. Hermétiquement

Storage

When units are delivered on site they are not always required immediately and are sometimes put into storage. In the event of medium to long-term storage, we recommend the following procedures:

- Keep protective plastic film in position.
- Ensure the electrical panels are closed.
- Keep all items and options supplied in a dry and clean place for future assembly before using the equipment.
-
-

Maintenance access

With the new easy lock system integrated in eNeRGy, we can have different possibilities of panel opening, making more easy maintenance operations.

Panels can be opened rightwards, leftwards and they can also be dismounted completely, by removing all the lockers.

Condensate drains

The condensate drains are not assembled when delivered and are stored in the electrical panel with their clamping collars. To assemble them, insert them on the condensate tray outlets and use a screwdriver to tighten the collars.

Preliminary checks

Before installing the equipment, the following points MUST be checked:

- Is there sufficient space for the equipment?
- Is the surface on which the equipment is to be installed sufficiently solid to withstand its weight? A detailed study of the frame must be made beforehand.
- Do the supply and return ductwork openings excessively weaken the structure?
- Are there any obstructing items which could hinder the operation of the equipment?
- Does the electrical power available correspond to the equipment's electrical specifications?
- Is drainage provided for the condensate?
- Is there sufficient access for maintenance?
- Installation of the equipment could require different lifting methods which may vary with each installation (helicopter or crane). Have these been evaluated?
- Ensure that the unit is installed in accordance with the installation instructions and local applicable codes.
- Check to ensure that the refrigerant lines do not rub against the cabinet or against other refrigerant lines.

In general, make sure no obstacles (walls, trees or roof ledges) are obstructing the duct connections or hindering assembly and maintenance access.

Installation requirements

The surface on which the equipment is to be installed must be clean and free of any obstacles which could hinder the flow of air to the condensers:

- Avoid uneven surfaces
- Avoid installing two units side by side or close to each other as this may restrict the airflow to the condensers.

Before installing a packaged rooftop unit it is important to understand:

- The direction of prevailing winds
- The direction and position of air flows.
- The external dimensions of the unit and the dimensions of the supply and return air connections.
- The arrangement of the doors and the space required to open them to access the various components.

Connections

- Ensure that all the pipe-work crossing walls or roofs are secured, sealed and insulated.
- To avoid condensation problems, make sure that all pipes are insulated according to the temperatures of fluids and type of rooms.

NOTE: The packaging protection fitted on the finned surfaces must be removed prior to start up.

Roof opening dimensions

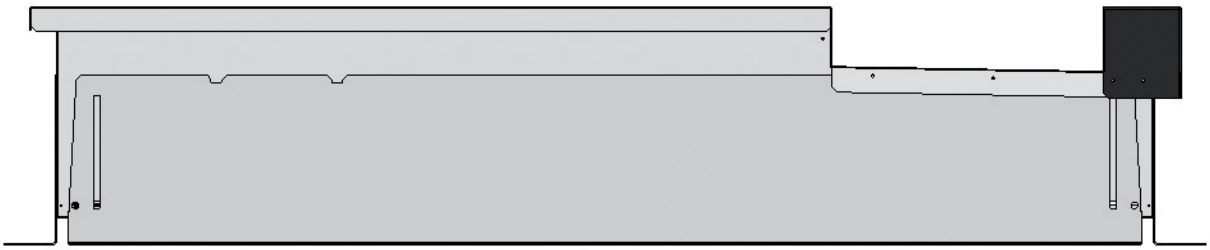
The roof opening dimensions & maximum slope are defined according mechanical drawings.

Sealing checks

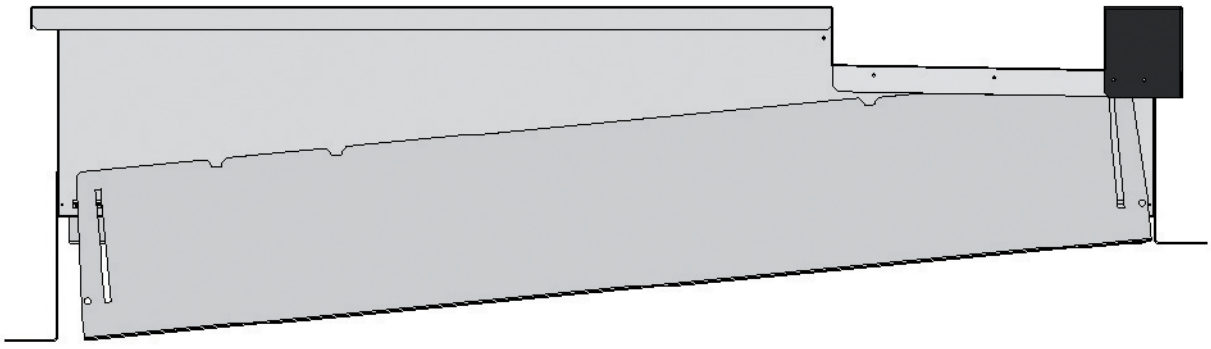
IMPORTANT note: Prior to put the machine on the curbs make sure polyethylene foam is fitted on the curb upper flange side (must be delivered with the curb).
This gasket must be put only on the external perimeter of the curb and around the supply and return section.

Levelling adjustable roofcurbs

Above all, ensure that all the adjustable returns are facing outward. They could be turned inside-out for transport.



Place the roof mounting frame on the trimmer beam by first lining up the inlet and the outlet opening.



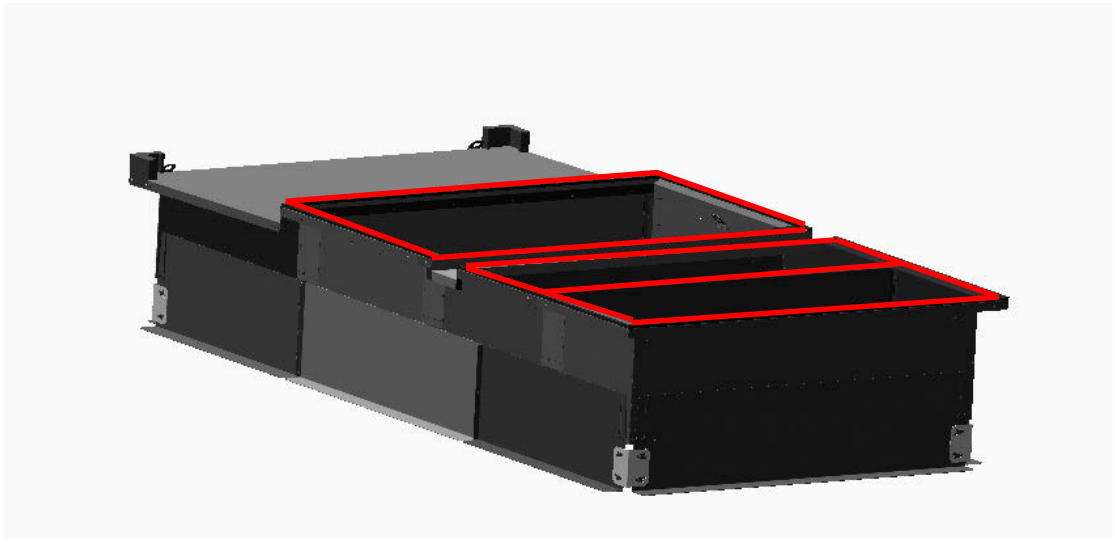
After levelling the frame, secure the adjustable returns on the trimmer.

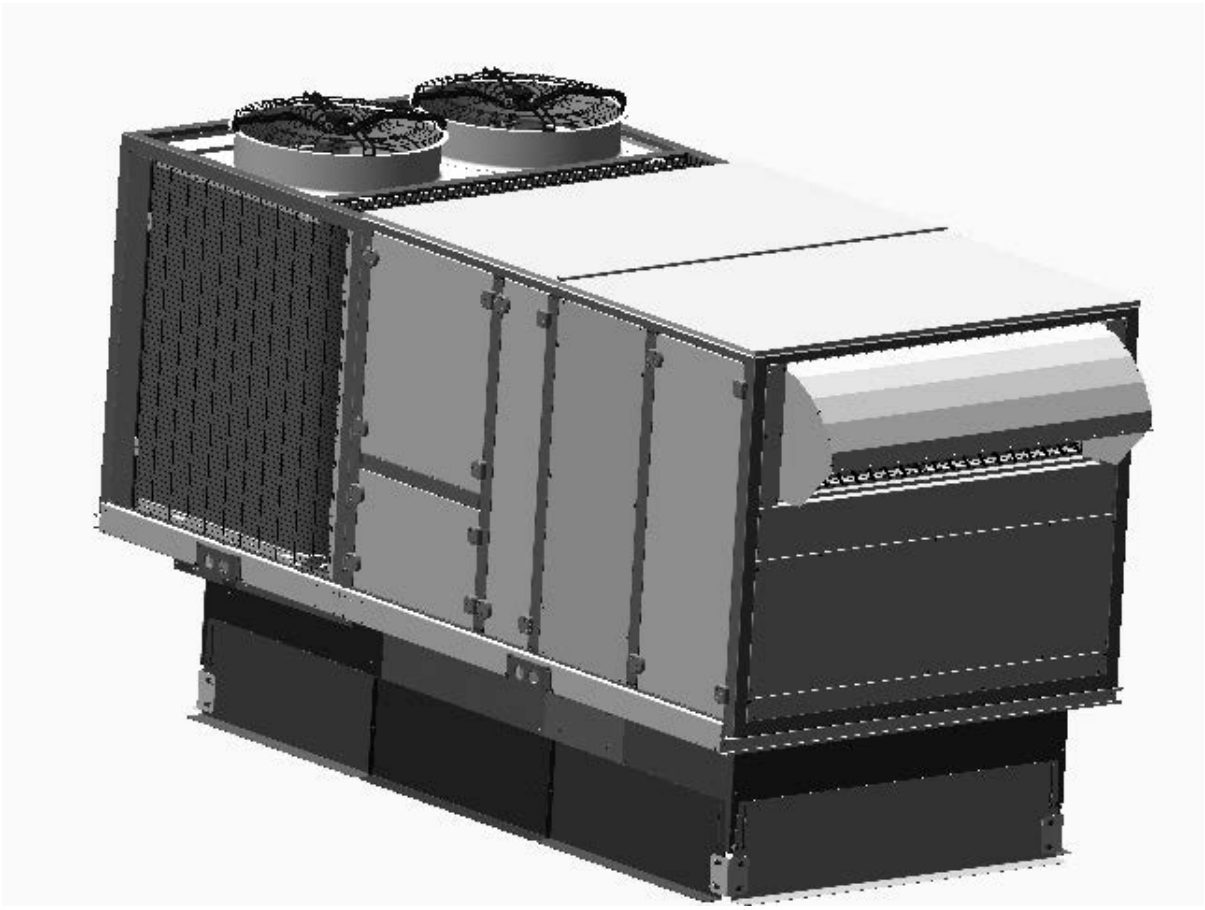
IMPORTANT NOTE: Securing the curb

When the frame is correctly positioned, it is essential to secure the assembly with a disconnected stitched welded seam (20 to 30 mm every 200 mm) or self taping screw diameter M6 along the outside or by using an alternative method.

Positioning the rooftop on adjustable roofcurbs

IMPORTANT note: Prior to put the machine, make sure to put a polyethylene gasket on the curb upper flange side (must be delivered in the curb package).
This gasket must be put only on the external perimeter of the curb and around the supply and return section





Sealing checks

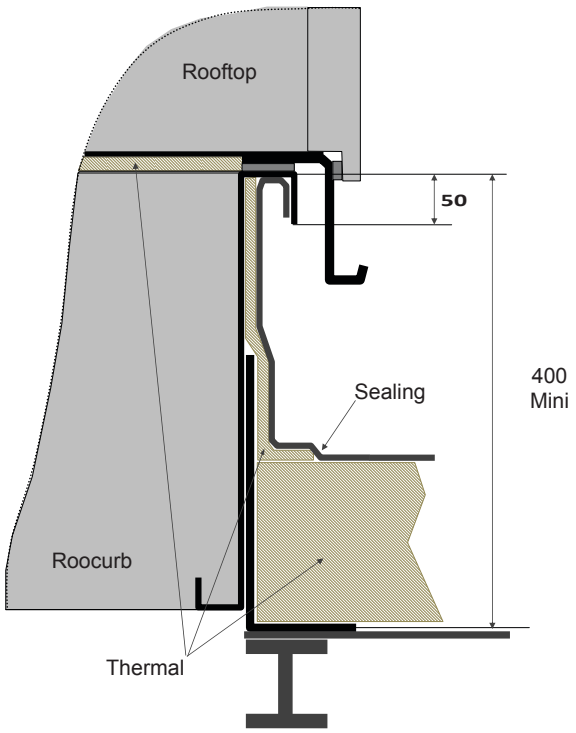
IMPORTANT NOTE: Prior to put the machine on the roofcurb, make sure to put a polyethylene foam on the curb upper flange side.
This gasket must be put only on the external perimeter of the curb and around the supply and return section

Curbing and flashing

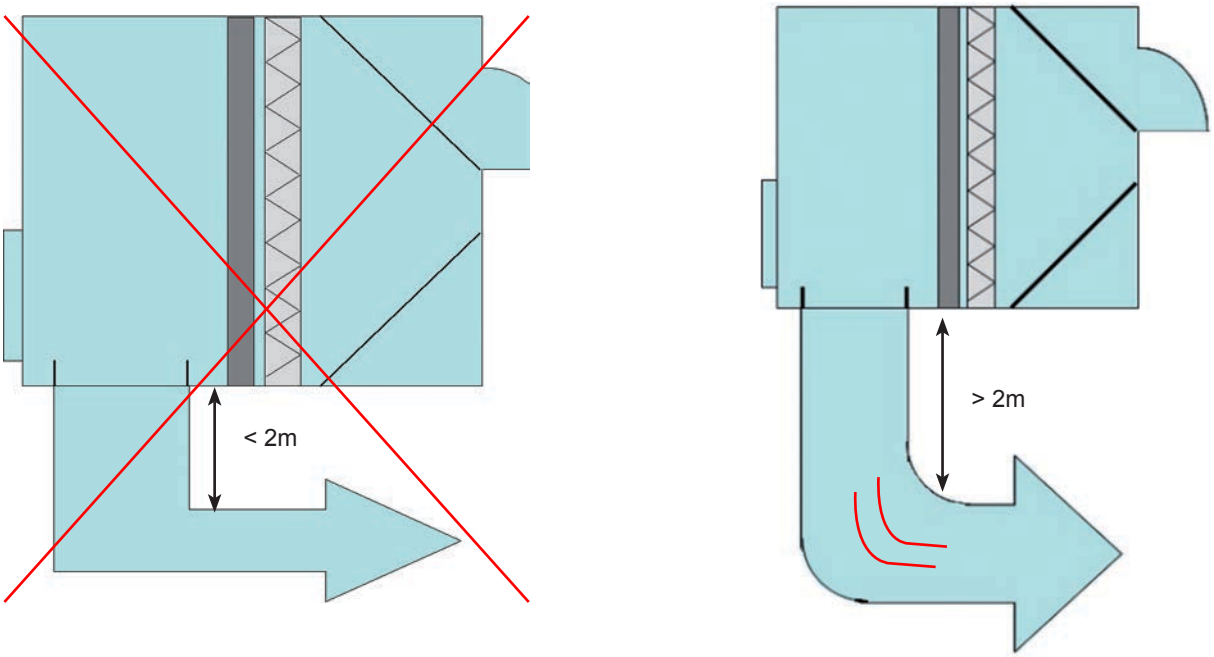
Outside of frame must be insulated with rigid type insulation. We recommend a minimum of 20 mm thick insulation.

Check that the insulation is continuous, counter flash and seal around the frame as shown.
CAUTION: To be effective, the upstream must end below the drop edge. Where pipes and electrical conduits extend through the roof, flashing must conform to local codes of practice

Before installing the equipment, make sure that seals are not damaged and check that the unit is secured to the mounting frame. Once in position, the bottom of the equipment must be horizontal. The installer must comply with local authority standards and specifications.



Vertical supply



HEAT RECOVERY - GENERAL DESCRIPTION

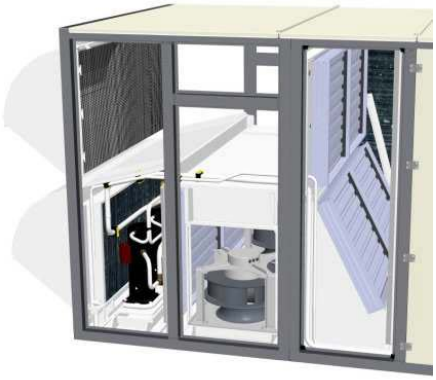
Heat recovery modules have following interests:
- in winter season and heating mode, the heat in the extract air is exchanged with the fresh air ;
- conversely, in summer season and cooling mode, the heat of the fresh air is transferred to the extract air.

HRMV recovers the heat from the extracted air through a rotary wheel.

TRMO is a thermodynamic heat recovery module, included in the machine. Its main interests are:
- a variable fresh air rate from 25 to 100%,
- a high COP in winter when pre-heating the fresh air due to a favorable evaporating temperature, especially with high air flow rate;
- a high EER in summer when pre-cooling the fresh air due to a favorable condensing temperature, especially with high air flow rate.

For those reasons, TRMO will be more suitable than HRMV in areas where the difference between indoor temperature and outdoor temperature is low. For example, in Mediterranean areas, where winter temperatures are not very cold or summer temperatures are not very high.

HRMV and TRMO will be delivered totally assembled in the unit.



1.REFRIGERATION CIRCUIT

Frigorific components access:
Compressor are located in an additional module before extraction module.

TRMO	E014-E019	E022-E027
Compressors	ZP104	2x ZP104
Thermostatic expansion valves	ERZE-8-GA	2x ERZE-8-GA

2. COMMISSIONING

Electrical connections:

- All wire connections are factory made.

Starting up:

- CLIMATIC™ configuration:
  - Power the unit
  - Check the configuration of the e-Climatic with the DS in expert mode. See § Control Manual / Configuration
- Start the TRMO circuit (circuit 3): switch Test=**'C3--Cool'**
  - check the sense of rotation of the compressors
  - check frigorific values (HP, LP, overheating and subcooling).
- Repeat the last operations with Test=**'C3--Heat'**

WARNING! During the settings, wait until the economizer is fully closed or opened, since it takes 1-2 minutes to switch.

3. SERVICE DIAGNOSTIC

Refrigeration
Indoor or exhaust fan blower:
For both indoor supply fan and exhaust fan, same faults, causes and solutions than for eNeRGy™ are expected. See diagnostic of ENeRGy™ 'Indoor fan blower'.

Fault	Possible causes and symptoms	Solution
Low LP and LP cut out	Alarm 317: main frigorific issue	Lack of charge, obstructed components
	Alarm 327: too low LP	Freezing: wait that coil is defrosted by exhaust air. Too low airflow rate on evaporating side (too low speed rate / fouled filter or coil).
HP problem and HP cut out	Incorrect airflow rates	Check fan (exhaust or supply) function of the mode (Amps) and also filter.
	Refrigerant charge too high	Check the refrigerant charge load according to the refrigerant load table.

eNeRGy™

SERVICE MANUAL

Ref : eNeRGy_Service-IOM-1502-E

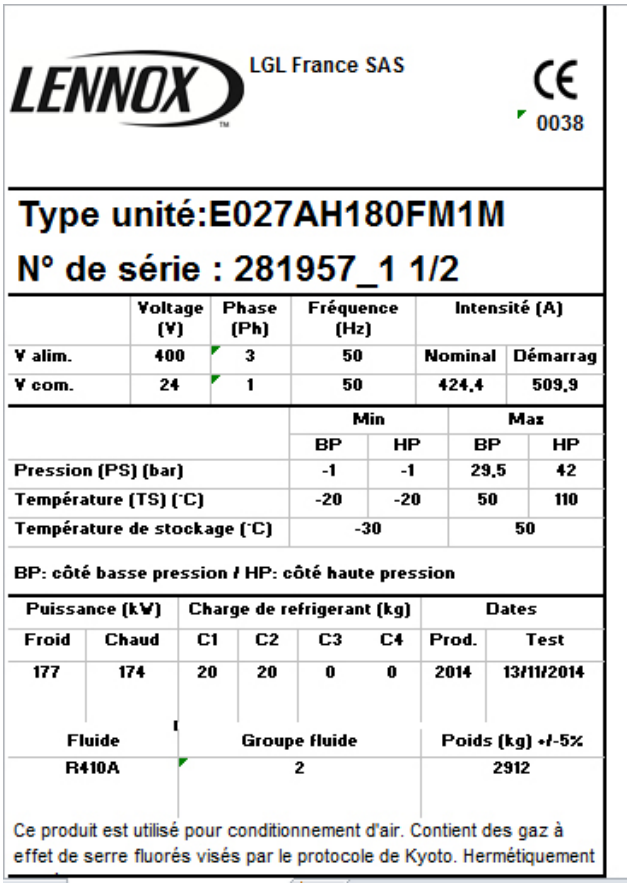
PRESSURE EQUIPEMENT DIRECTIVE INFORMATIONS	29
COMMISSIONING	
Operating limits	30
Before turning on the power	31
Wire connection tightness checks	31
Powering the unit	32
CLIMATIC™ configuration	32
FRESH AIR HOOD	34
FILTERS	35
REFRIGERATION SKETCH	36
REFRIGERATION CIRCUIT	40
HEATING OPTIONS	
Hot water coils	41
Recovery water coil	42
Electric heater	43
Electrical preheater	44
GAS BURNERS	45
SERVICE DIAGNOSTIC	55
WARRANTY	57
MAINTENANCE PLAN	59
COMMISSIONING RECORD SHEET	64
REFRIGERANT TRANSACTIONS LOGBOOK: EUROPEAN REGULATION N° 842/2006	66

CE marking compliance

These units are CE marked according to Pressure Equipement Directive.

Section	Phase	PS (bars gauge)
Suction	Vapor	29,5
Discharge	Vapor	42 bar R410A
Liquid	Liquid / Vapor	42 bar R410A

Name plate example



LENNOX LGL France SAS CE 0038

Type unité:E027AH180FM1M

N° de série : 281957_1 1/2

	Voltage (V)	Phase (Ph)	Fréquence (Hz)	Intensité (A)	
V alim.	400	3	50	Nominal	Démarrag
V com.	24	1	50	424,4	509,9

	Min		Max	
	BP	HP	BP	HP
Pression (PS) (bar)	-1	-1	29,5	42
Température (TS) (°C)	-20	-20	50	110
Température de stockage (°C)	-30		50	

BP: côté basse pression / HP: côté haute pression

Puissance (kW)		Charge de refrigerant (kg)				Dates	
Froid	Chaud	C1	C2	C3	C4	Prod.	Test
177	174	20	20	0	0	2014	13/11/2014

Fluide	Groupe fluide	Poids (kg) +/-5%
R410A	2	2912

Ce produit est utilisé pour conditionnement d'air. Contient des gaz à effet de serre fluorés visés par le protocole de Kyoto. Hermétiquement

Periodical visit according european pressure equipment directive

According to Pressure Equipments Directive, periodical controls on site are expected on equipments equal or above category II.

All the components must be installed by a qualified engineer.

OPERATING LIMITS

Prior to any operation, please check the operation limits of the unit. These tables will give you all necessary information concerning the operating envelop of the unit.
Please consult the «Risk analysis and hazardous situations according to 97/123 directive» given in the «APPENDIX» at the end of this manual, or supplied with the unit.

WARNING: It is very important ensure the units operate well inside these envelopes.

	E014--055F	E014--065F	E014--075F	E016--085F	E016--105F	E019--066F	E019--076F	E019--086F	E019--106F	E019--124F
Cooling mode operating limits (5)										
Max. outdoor temperature Indoor 27°C DB/ 19°C WB	48									
Max. outdoor temperature Mini indoor temp. DB/47% HR	48									
Max outdoor temperature with unloading	49,5	51	48	50	50	48,5	44,5	48	49,5	46,5
Min. outdoor temperature at indoor 20°C DB (6)	-5	-3	12	14,5	14,5	-5	10	13,5	13,5	13
Min. outdoor temperature Max indoor temp. 23°C DB/47% HR	12	14	13	15	29	13	11	14	14	13
Max. entering indoor coil temperature Outdoor 38°C DB	35	40	39	41	55	31	29	32	48	48
Max. entering indoor coil temperature Max outdoor temp. 48°C DB/40%HR	28	31	31	31	31	27	28	30	31	31
Min. entering indoor coil temperature Outdoor 35°C DB	14									
Min. entering indoor coil temperature Max outdoor temp. 48°C DB/40%HR	14	14	15	16	19	14	14	14	16	17
Heating mode operating limits (5)										
Min. outdoor temperature Indoor 20°C DB (8)	-15									
Min. outdoor temperature Min indoor temp. 5°C DB/59%HR	14	3	5	2	-2	15	16	10	2	0
Min. entering indoor coil temperature	5	5	5	5	5	5	9,5	7	5	5
Max. entering indoor coil temperature	25									
Max. outdoor temperature Max indoor temp.25°C DB/59%HR	24	23	24	23	24	23	24	23	25	29
Min. outdoor temperature Indoor 20°C DB/100%fresh air/with electrical Std pre-heater	2,3	0	1	0	5	4	5	3	5	5
Min. outdoor temperature Indoor 20°C DB/100%fresh air/with electrical High pre-heater	-8	-10	-9	-8	2	-3,5	-2	-4	-6	-7

(5) Cooling and heating operating limits are given for steady state running condition with noted temperature condition
(6) below this value, option "Low ambiant kit" is required

Cooling :
Outdoor temperature (dry bulb) : 26.7°C, Indoor temperature (dry bulb) : 26.7°C, Indoor temperature (wet bulb) : 19.4°C,

	E022--077F	E022--087F	E022--107F	E022--140F	E024--078F	E024--088F	E024--108F	E024--126F	E024--141F	E027--160F	E027--180F
Cooling mode operating limits (5)											
Max. outdoor temperature Indoor 27°C DB/ 19°C WB	48	48	48	48	48	48	48	48	48	48	48
Max. outdoor temperature Mini indoor temp. DB/47% HR	48	48	48	48	48	48	48	48	48	48	48
Max outdoor temperature with unloading	52	53	49,5	51,5	51,5	52,5	49	49	51	49,5	49,5
Min. outdoor temperature at indoor 20°C DB (6)	12,5	6,5	13,5	16	12	6	12,5	12,5	15	7	7
Min. outdoor temperature Max indoor temp. 23°C DB/47% HR	14	7	14	29	13	8	13	13	9	7	20
Max. entering indoor coil temperature Outdoor 38°C DB	35	34	46,5	37,5	29,5	28,5	44	44	36,5	41	36,5
Max. entering indoor coil temperature Max outdoor temp. 48°C DB/40%HR	31	28	31	31	30	28	31	31	31	31	31
Min. entering indoor coil temperature Outdoor 35°C DB	14	14	14	14	14	14	14	14	14	14	14
Min. entering indoor coil temperature Max outdoor temp. 48°C DB/40%HR	14	14	16	20	18	19	14	14	17	17	19
Heating mode operating limits (5)											
Min. outdoor temperature Indoor 20°C DB (8)	-15	-15	-15	-15	-15	-15	-15	-15	-15	-15	-15
Min. outdoor temperature Min indoor temp. 5°C DB/59%HR		-3	5	-15		2	12	8	-15	-15	-15
Min. entering indoor coil temperature	13	5	5	5	14	5	7	5	5	5	5
Max. entering indoor coil temperature	25	25	25	25	25	25	25	25	25	25	25
Max. outdoor temperature Max indoor temp.25°C DB/59%HR	29	23	29	23	26	24	30	29	23	24	24
Min. outdoor temperature Indoor 20°C DB/100%fresh air/with electrical Std pre-heater	6	5	1	5	8	0	3	2	5	5	5
Min. outdoor temperature Indoor 20°C DB/100%fresh air/with electrical High pre-heater	-4	5	-8	4	-2	-9	-5	-6	5	5	5

WARNING: commissioning must only be carried out by trained refrigeration engineers whom qualification certificates are compliant with the local regulation

Before turning on the power

WARNING: ensure that the power supply includes 3 phases with no neutral

Ensure that the power supply between the building and the unit meets local authority standards and that the cable specification satisfies the start-up and operating conditions displayed on the name plate.

Wire connection tightness checks

WARNING: check the wire connection tightness

Check the following wire connections for tightness:

- Main switch connections,
- Mains wires linked to the contactors and circuit breakers
- Cables in the 24V control supply circuit.
-

OIL CHARGE

All units are delivered with a complete oil charge, and there is no need to add any oil before start up or afterwards. Overcharging with oil can cause serious problems on an installation, particularly for the compressors.

Oil Recommendation for LENNOX Roof Tops			
Refrigerant	**Compressor type**	**Brand**	**Oil Type**
R410A	Scroll	Lennox	POE Polyolester oil

Powering the unit

Power up the unit by closing the isolator switch.
The fans and compressors direction of rotation is checked during the end of line test. They should therefore all turn in either the right or wrong direction.

WARNING: a compressor rotating in the wrong direction will fail shortly.

If one of the components rotates in the wrong direction, disconnect the power supply a t the machine's isolator switch and reverse two of the component’s phases on the terminal within the electrical panel.

While starting the unit, fill in the check list sheet of this manual to be sure that the unit correctly installed and ready to operate.

- Check the current values per phase on each fan motor.
- Check the current values per phase on each compressor motor.
- Check suction and discharge pressures and compressor suction temperature.
- Check chilled liquid entering and leaving temperatures if water cooled unit
- Check outdoor air temperature and indoor temperature Check if DAD is ON.

These verifications should be made as quickly as possible with a stable cooling load, i.e. the cooling load of the installation should be the same as the capacity developed by the unit. Measurements taken without heeding this condition will result in unusable and probably wrong values.
These verifications can only be made once the proper operation of all safety devices and unit controls has been established.

Check if the customer's air ducts are open to be sure the unit is not running with ducts closed. In addition it is needed to check if the airflow and available static pressure are in accordance with the unit .

CLIMATIC™ configuration

Settings

1. **Supply Air-flow adjustement (depending on customer requirements)**
   a. 3333 = nominal air flow
   b. 3334 = reduced air flow
   c. 3332 = Manual/Automatic
   d. 3331 = Nominal/DeadZone/PartLoad/Pressure

2. **Exhaust Air-flow adjustement (optional)**
   a. 3864 = nominal air flow
   b. 3865 = reduced air flow

3. **Scheduling (depending on customer requirements)**
   a. Zones & Modes (Night/Day/Day I/ DayII)
   b. Setpoints per mode

4. **Regulation temperature probe selection**
   a. Select the regulation probe (DC, Return, Customer, etc.) in the Room Temp. Config screen

5. **Regulation humidity sensor selection (optional)**
   a. Select the regulation sensor (Remote, Customer) in the Room Hum. Config screen

6. **Outside temperature probe selection**
   a. Select the outdoor temp probe (Unit, Customer) in the Outside Temp. Config screen

7. **Outside humidity sensor selection (optional)**
   a. Select the outdoor hum sensor (Unit, Customer) in the Outside Hum. Config screen

8. **Air quality sensor selection (optional)**
   a. Select the air quality CO2 sensor (Remote, Customer) in the CO2 Config screen

9. **Remote display configuration**
   a. 3151 = DC simple / DC full / DM

10. **Minimum fresh air**
    a. 3121 = minimum opening %

Check:

1. **Air-flow Vs Damper**
   a. Test B.Nom100% :
      i. adjust the blower speed % (3333) to get the required air-flow
      ii. adjust the exhaust speed % (3864) to get the required air-flow
   b. Test B.Nom0%:
      i. adjust the damper compensation (3335) to maintain the required air-flow even with damper fully closed
      ii. adjust the damper compensation (3366) to maintain the required air-flow even with damper fully closed

2. **Filter safety thresholds**
   a. Test B.Nom100% and Test B.Nom0% : read filter ΔP (3442) and adjust the bigger measure multiplied by 2.5 at threshold 3345

3. **Frigorific circuit tests**
   a. Cooling mode
      i. Test C---Cool:
         1. Check circuit pressures and temperatures
         2. Check electrical consumptions
   b. Heating mode
      i. Test C---Heat:
         1. Check circuit pressures and temperatures
         2. Check electrical consumptions

4. **Unit option tests**
   a. Electrical Auxiliary heaters (Test H1-1 Full)
      i. Check supply temperature
      ii. Check electrical consumption
   b. Hot Water Auxiliary heaters (Test H1-1 Full)
      i. Check supply temperature
      ii. Check valve opening
   c. Gas burner heaters (Test H1-1 Full)
      i. Refer to gas burner chapter
   d. Electrical Fresh-air pre-heaters (Test H2-1 Full)
      i. Check supply temperature
      ii. Check electrical consumption
   e. Hot water eRecovery heaters (Test H2-1 Full)
      i. Check supply temperature
      ii. Check valve opening
   f. TRMO
      i. Test C3---Cool:
         1. Check circuit pressures and temperatures
         2. Check electrical consumptions
      ii. Test C3---Heat:
         1. Check circuit pressures and temperatures
         2. Check electrical consumptions
   g. HRMO (Rec.Wheel)
      i. Check wheel motor rotation

5. **Advanced regulation optimization**
   a. Compressor ΔT
      i. Cooling.
         1. Test C1c1 Cool: read |Mix-Supply| temp and adjust compressor stage ΔT at menu 3434
      ii. Heating.
         1. Test C1c1 Heat: read |Mix-Supply| temp and adjust compressor stage ΔT at menu 3444
   b. Auxiliary Heaters ΔT (Gas burner or electrical)
      i. Heating.
         1. Test H1-1: read |Mix-Supply| temp and adjust heaters stage ΔT at menu 3734
   c. Staging sequence (compressor/electrical/water/burners)
      i. Aux Heaters Priority 3731= Never/ Always /OutTemp
      ii. Pre Heaters Priority 3736= First/Last
   d. Dynamic setpoint
      i. 3225= ΔT between customer set point and outdoor temperature
   e. Fine temperature control
      i. Smooth 3231= No/ DeadZone/Comfort

6. **Leak Detection**
   a. Cooling
      i. Test C1--Cool: read Subcooling and adjust 3437
      ii. Test C2--Cool: read Subcooling and adjust 3438
   b. Heating
      i. Test C1--Heat: read Subcooling and adjust 3447
      ii. Test C2--Heat: read Subcooling and adjust 3448

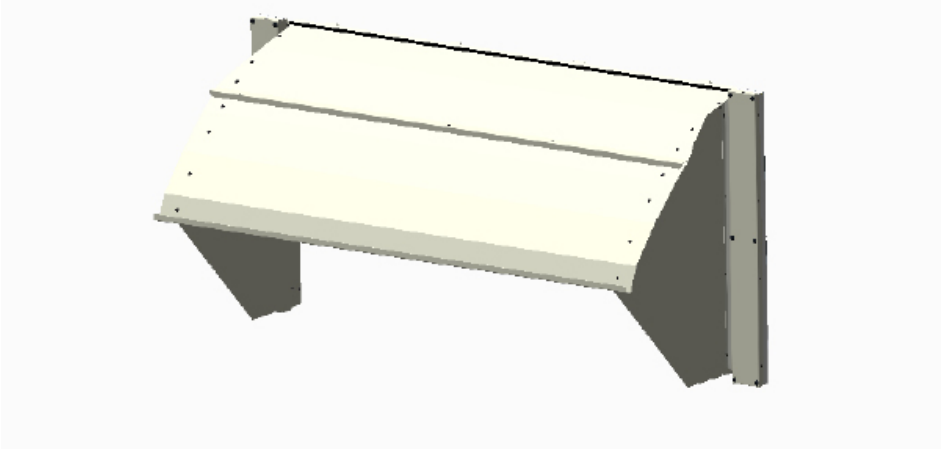
Once all the settings have been adjusted, the list of parameters must be downloaded (Wizard tool), stored and signed by the customer.

Installing

The fresh air hood has to be opened and secured during commissioning.
The 3 parts of the fresh air hood have to be assembled thanks to self taping screws delivered in the spare part box
Check the proper position of the black seal on the top of the hood cover.

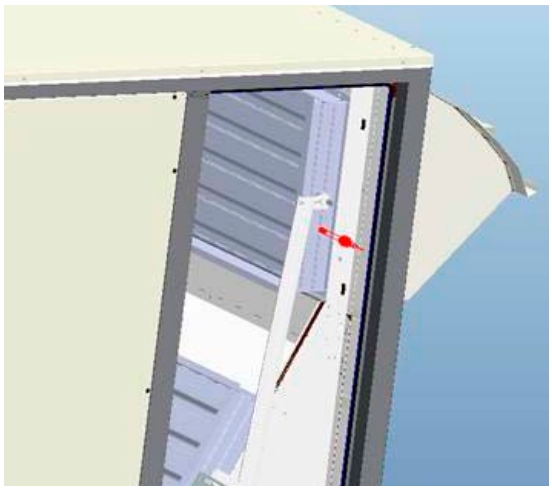
Wind direction

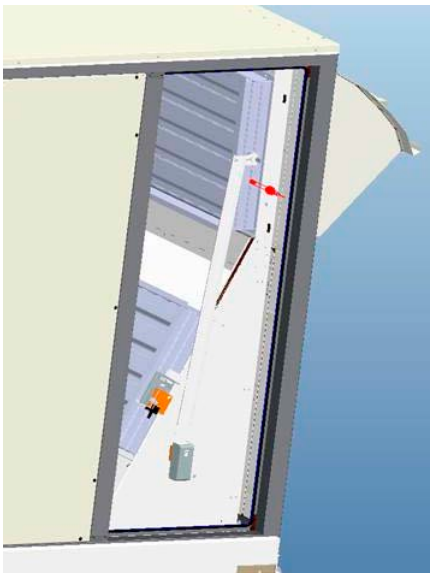
The prevailing wind has to be taken into account while choosing the machine position on the building roof.
It's highly recommended to avoid putting the fresh air hood in the prevailing wind direction to avoid water ingress risks.
If this is not possible please contact us to require specific water droplet strainer in the hood section.



WARNING: the fresh air hood cover can hurt your head if you don't pay attention while turning around the unit.

Fit the hygrometric sensor. After opening of the fresh air hood, put in front of the air flow the Hygrometric sensor.





Filter replacement

After opening the filter access panel, lift the filter retaining log. The filters can then be removed and replaced easily by sliding the dirty filters out and clean ones in.

Use the fixation guide to remove the filters sliding one by one into the rail.

UNITS

E014AH055FM1M
E014AH065FM1M
E019AH066FM1M
E014AH075FM1M
E019AH076FM1M
E016AH085FM1M
E019AH086FM1M
E016AH105FM1M
E019AH106FM1M
E019AH124FM1M
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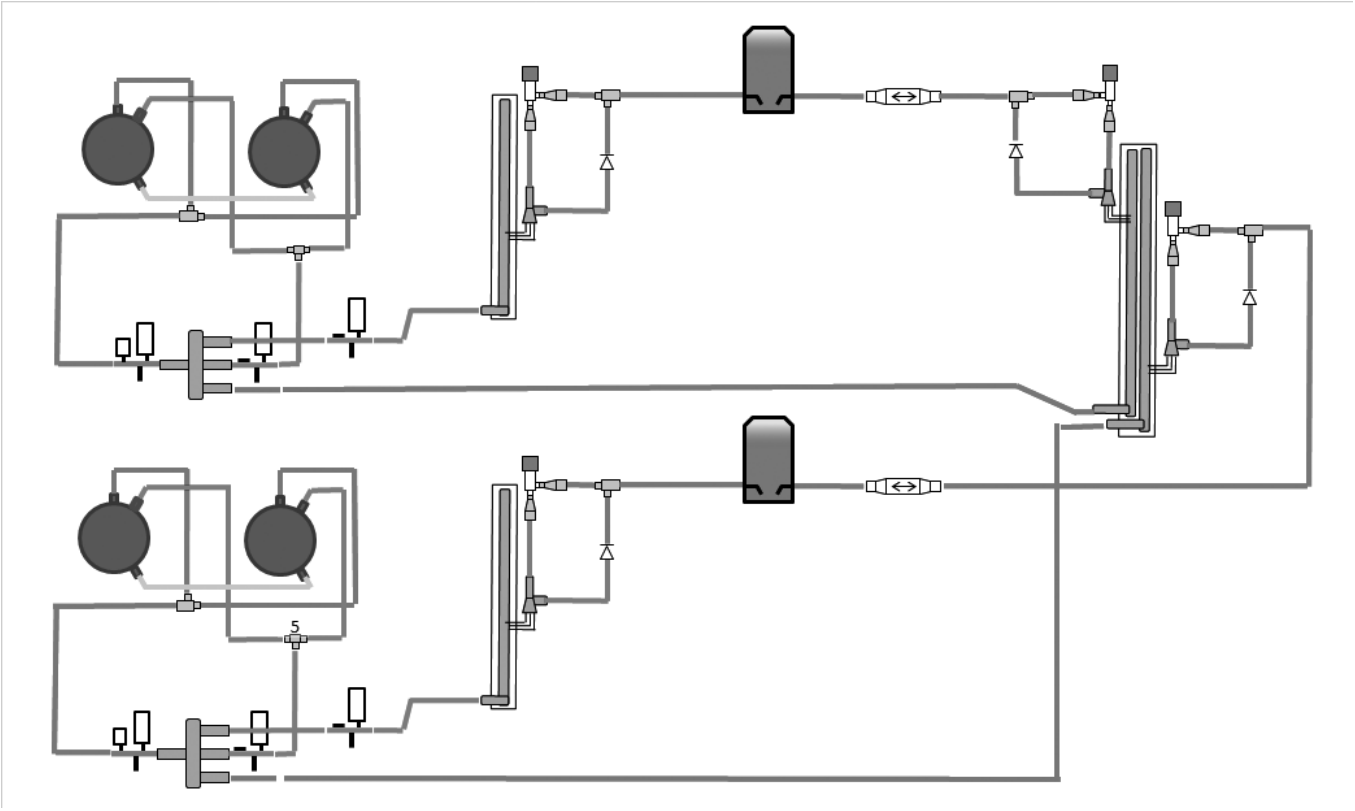
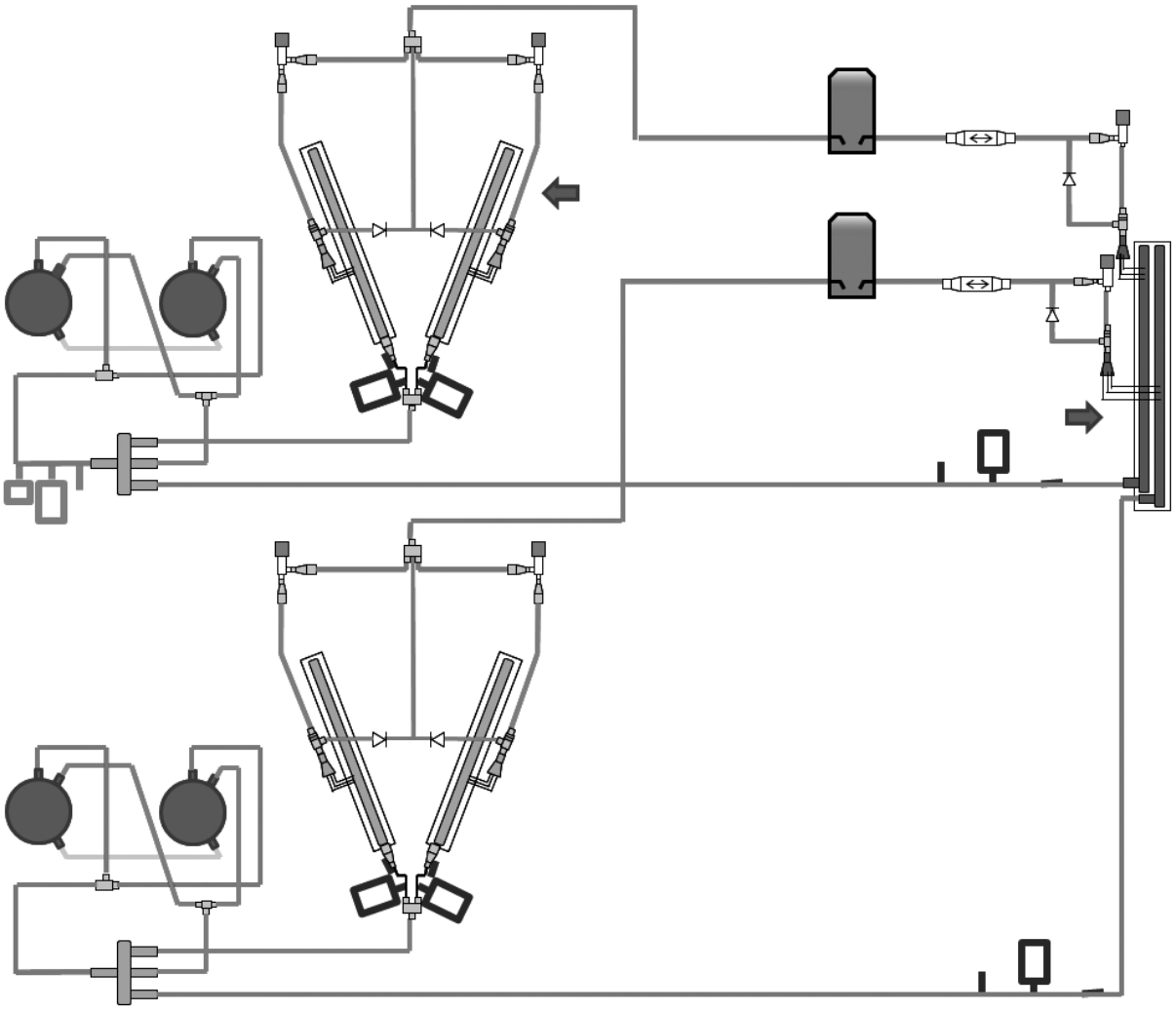
E024AH088FM1M
E022AH107FM1M
E024AH108FM1M



UNITS

E024AH126FM1M
E022AH140FM1M
E024AH141FM1M
E027AH160FM1M



UNITS

E014AC055FM1M
E014AC065FM1M
E019AC066FM1M
E014AC075FM1M
E019AC076FM1M
E016AC085FM1M
E019AC086FM1M
E016AC105FM1M
E019AC106FM1M
E019AC124FM1M
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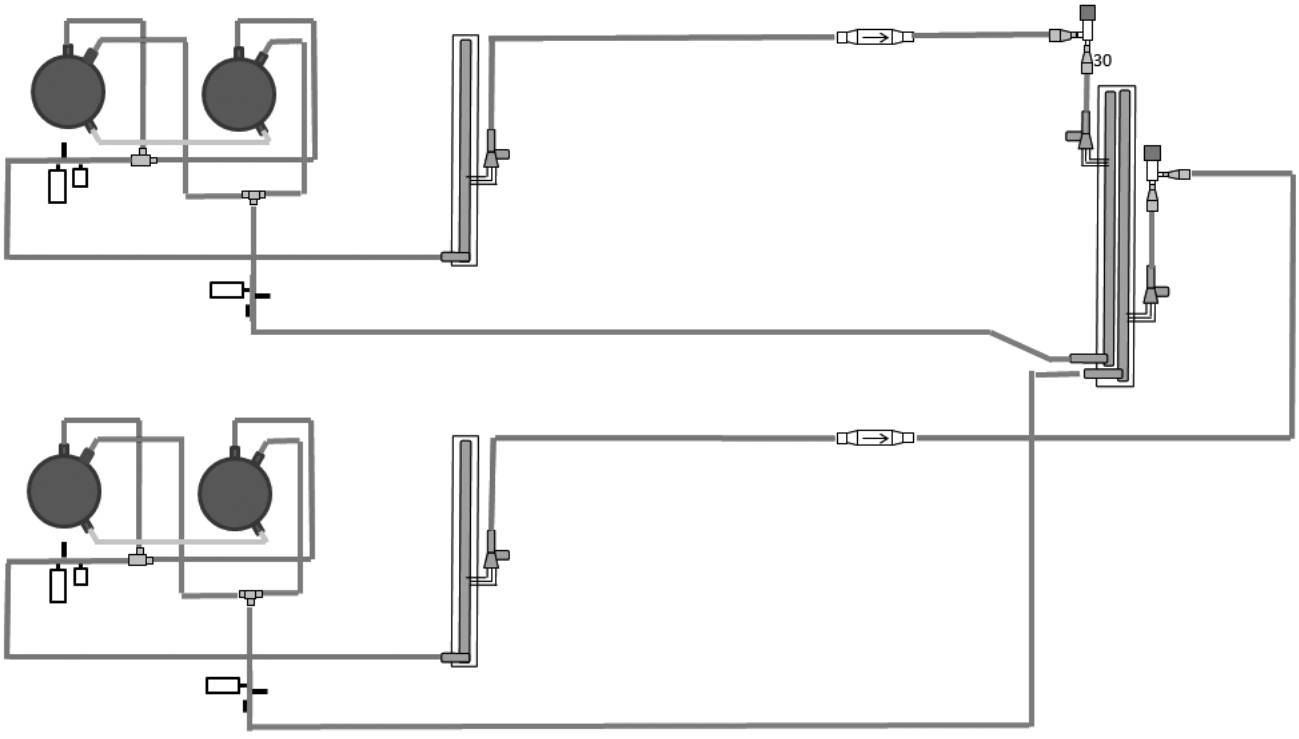
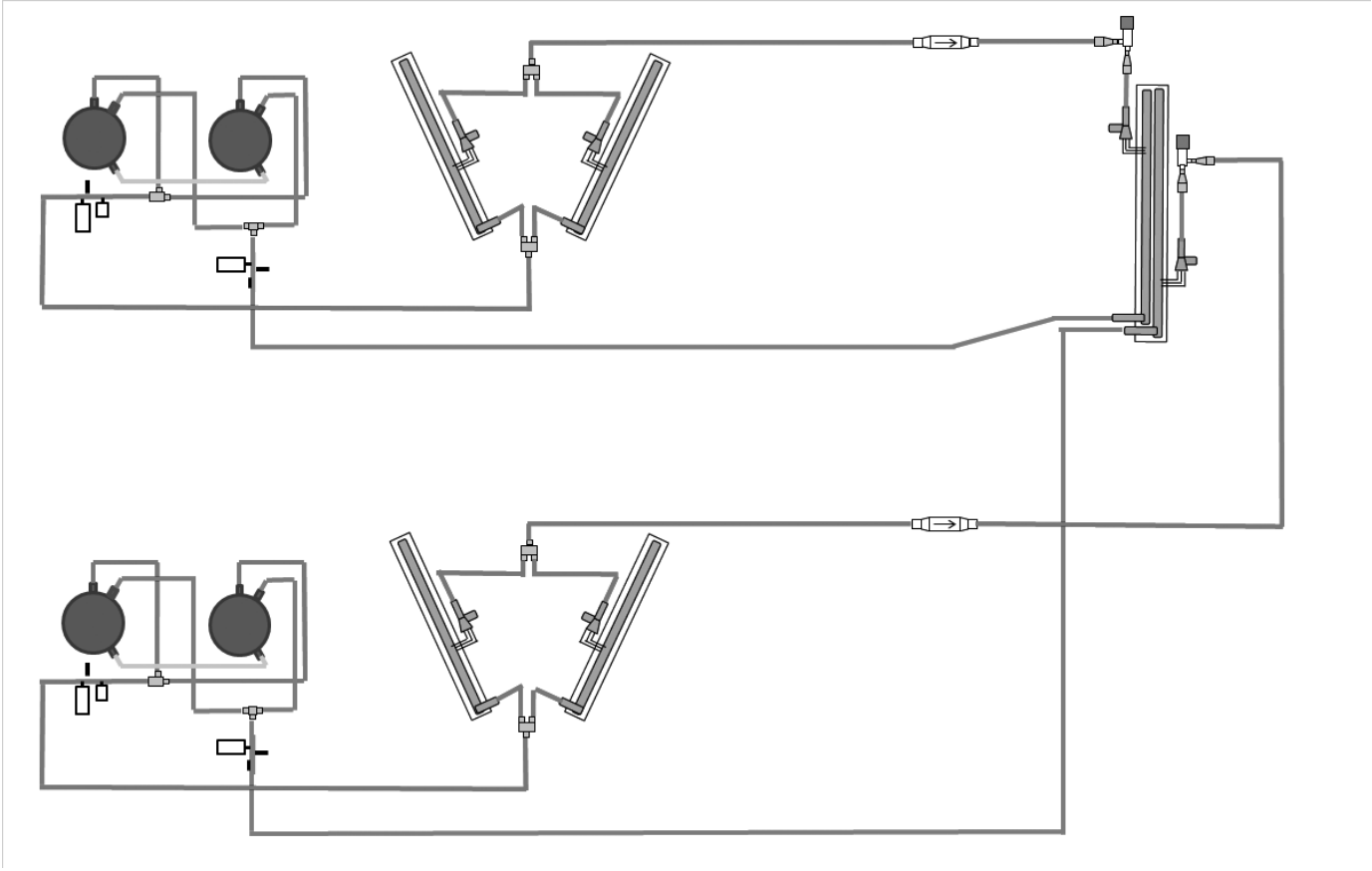
E022AC087FM1M
E024AC088FM1M
E022AC107FM1M
E024AC108FM1M



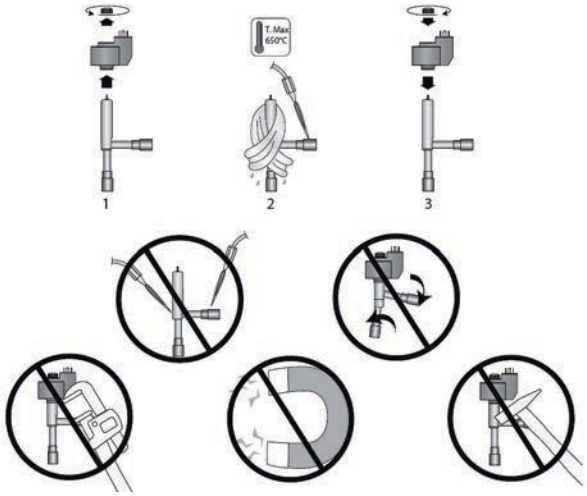
UNITS

E024AC126FM1M
E022AC140FM1M
E024AC141FM1M
E027AC160FM1M

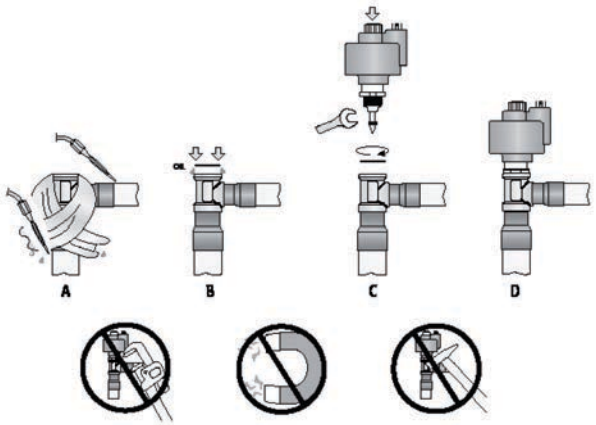


EEV adjustments
EEV allows the control of superheat (see control sections).

E2V welding instructions
Electronic expansion valves are sensitive to dust – strainers must be used in case of replacing.

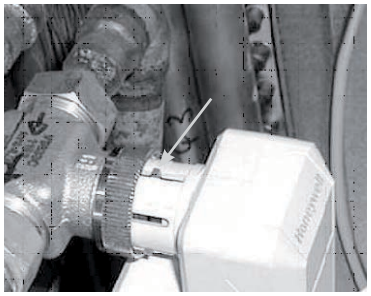


E3V welding instructions



Hot water coils

The hot water coil is fitted with a three way proportional valve . Two spanners must be used to tighten the connections. One spanner must maintain the valve body when connecting the pipe-work to the main. Failure to do so may damage the pipes joints and invalidates the warranty.



Filling up and starting the system

- Adjust the control for Heating by reducing the simulated ambient temperature down to 10°C
- Check that the red indicators located under the valve actuator are moving correctly with the signal.(Arrow on the picture)
- Fill the hydraulic system and bleed the coil using the air vents. Check incoming hot water flow rate.
- Check the various connections for possible leaks

Maximum working pressure:	8 Bars
Maximum working temperature:	110 °C

Freeze protection

Check the hydraulic system contains glycol for protection against freezing. Glycol is the only effective protection against freezing. The antifreeze must protect the unit against freezing under winter conditions.

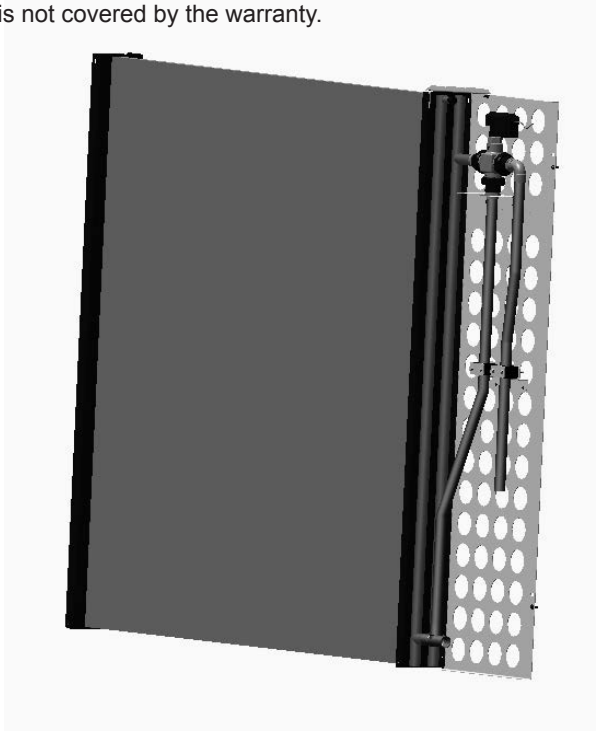
Warning: glycol based fluids may produce corrosive agents when mixed with air.

Drain the installation

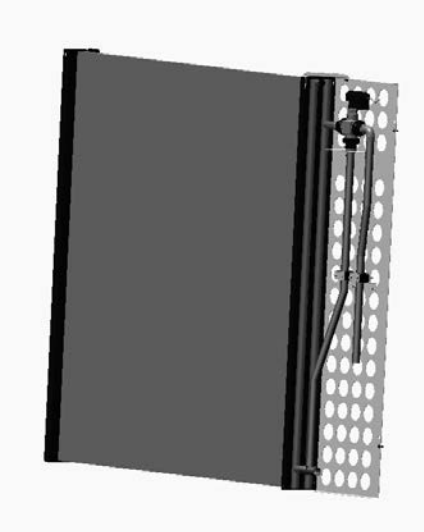
You must ensure that the manual or automatic air vents have been installed on all high points in the system. In order to drain the system, check that all the drain valves have been installed on all low points of the system.
Heating hot water coils frozen due to low ambient conditions are not covered by the warranty.

Electrolytic corrosion

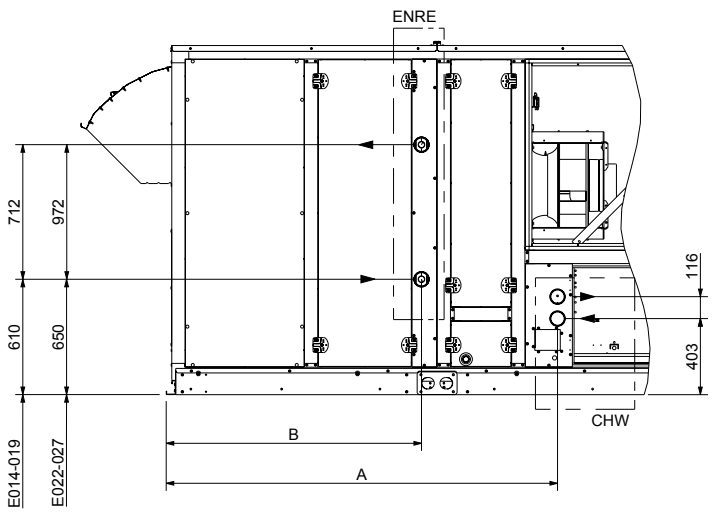
Attention is drawn to the corrosion problems resulting from electrolytic reaction created by unbalanced earth connections. Any coil damaged by electrolytic corrosion is not covered by the warranty.

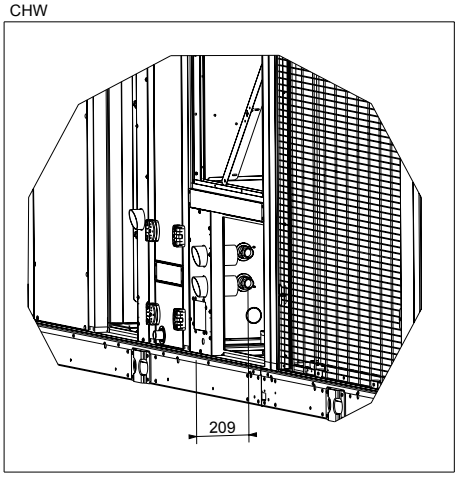


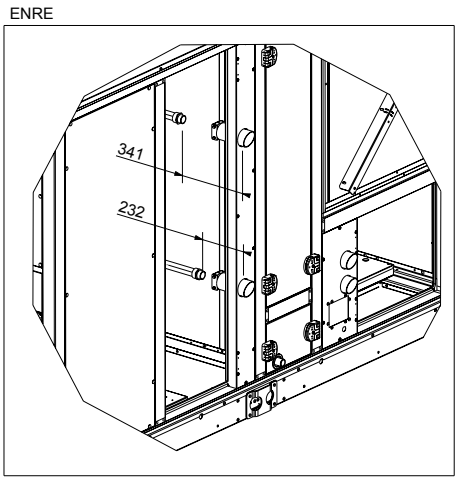
Heat recovery water coil is delivered with 3 ways valve included
It is placed just before the standard coil of the unit.



The freeze protection is made via fresh damper safeties nevertheless for a full freezing protection has to be done using glycoled water







	E014-019				E022-027			
	STD	ERVL	RWM V-H	TRM V-H	STD	ERVL	RWM V-H	TRM V-H
A	2070	3035	3623		2070	3035	3623	
B	1350	2315	2903		1350	2315	2903	

	E014 - E019	E022 - E027
CHWS - Threaded male	DN25 - 1"	DN32 - 1"1/4
CHWH - Threaded male	DN32 - 1"1/4D	N40 - 1"1/2
ENRE - Threaded male	DN32 - 1"1/4D	N40 - 1"1/2

Electric heater

WARNING: electric heater is connected heater to mains power – risk of electrical shock – switch off the unit prior to open this section

The eNeRGy electric heaters are placed after the coil.

In order to reduce the pressure drops the airflow is ducted around the shielded resistances. The resistances are made smooth stainless steel tubes with a capacity of 6W/cm^2.
It is protected as standard, against overheat via a high temperature overload protection set at 98°C.

There are three sizes available for each size of unit:
S: Standard heat
M: Medium heat
H: High heat

The standard heat electric heaters are staged control with 50% or 100%. The medium and high heat version are controlled through a fully modulating triac.

Unit	Description	Model	Capacity	Current
E014-E019	Standard	One step	36 Kw	52 A
	Medium	Modulating	90 Kw	129,9 A
	High heat	Modulating	108 Kw	155,8 A

Unit	Description	Model	Capacity	Current
E22-E27	Standard	One step	54 Kw	77,9 A
	Medium	Modulating	108 Kw	155,8 A
	High heat	Modulating	144 Kw	207,85 A

Electrical preheater

WARNING: electric pre-heater is connected heater to mainS power – risk of electrical Shock – switch off the unit prior to open this section

Pre-heater is running only with high fresh air rate under low outdoor ambient temperature (see setpoint in control section).

In order to reduce the pressure drops the airflow is ducted around the shielded resistances. The resistances are made smooth stainless steel tubes with a capacity of 6W/cm^2.

There are three sizes available for each size of unit:
S: Standard heat
M: Medium heat
H: High heat

Unit	Description	Model	Capacity	Current
E014-E019	Standard	One step	36 Kw	52 A
	Medium	Modulating	90 Kw	129,9 A
	High heat	Modulating	108 Kw	155,8 A

Unit	Description	Model	Capacity	Current
E22-E27	Standard	One step	54 Kw	77,9 A
	Medium	Modulating	108 Kw	155,8 A
	High heat	Modulating	144 Kw	207,85 A

Preliminary checks before start-up

Note:

Any work on the gas system must be carried out by qualified personnel.
This unit must be installed in accordance with local safety codes and regulations and can only be used in planed installation conditions for outdoor.
Please read carefully the manufacturer's instructions before starting a unit.
Before commissioning a unit with gas burner, it is mandatory to ensure that the gas distribution system (type of gas, available pressure…) is compatible with the adjustment and settings of the unit.

Check access and clearance around the unit

- make sure one can move freely around the unit.
- a minimum one-meter clearance must be left in front of the burnt gas exhaust flue.
- combustion air inlet and burnt gas exhaust(s) must not be obstructed in any way.

Supply network pipe sizing

Male threaded connection for gas burner: 3/4"

Check that the gas supply line can provide the burners with the pressure and the gas flow rate necessary to provide the heating nominal output.

WARNING: Do not forget to connect the condensate drain

Safety instructions

FUEL:
Before starting up the heater, make sure that:
• the gas mains supply data is compatible with the data stated on the nameplate;
• the combustion air intake ducts (when fitted) and the fume exhaust pipes are those specified by the manufacturer;
• the combustion air is supplied in such a way as to avoid even partial obstructions of the intake grille (caused by leaves etc.);
• the fuel intake internal and external seal is checked during the testing stage, as required by applicable standards;
• the heater is supplied with the same type of fuel it has been designed for;
• the system is correctly sized for such flow rate and is fitted with all safety and monitoring devices required by applicable standards;
• the inside of the gas pipes and air distribution ducts for ducted heaters has been thoroughly cleaned;
• the fuel flow rate is suitable for the power required by the heater;
• the fuel supply pressure is between the range specified on the nameplate.

GAS LEAKS
If you smell gas:
• do not operate electrical switches, telephones or any other object or device that could produce sparks;
• immediately open doors and windows to create an air flow to vent the gas out of the room;
• close the gas valves;
• call for qualified staff.

Product range

Unit	Description	Model		Capacity
E14-E19	Standard	PCH 80		16-82 Kw
	High heat	PCH 105		18-100 Kw
E22-E27	Standard	PCH 105		18-100 Kw
	High heat	PCH 210		18-200 Kw

MODEL		PCH080		PCH105		PCH210	
		min	max	min	max	min	max
Rated thermal input (hi)	kW	16,4	82	18	100	18	200
Rated thermal output	kW	17,8	80	19,6	97,2	19,6	194,4
Efficiency hi (p.C.I)	%	108,3	97,6	109,1	97,2	109,1	97,2
Efficiency hs (p.C.S)	%	97,6	87,9	98,3	87,6	98,3	87,6
Chimney loss -burner ON (hi)	%	0,3	2,4		2,8		2,8
Chimney loss -burner OFF (hi)	%	<0,1		<0,1		<0,1	
Max.Condensation produced (2)	l/h	3,3		2,7		5,4	
Carbon monoxide CO (0% diO2) (3)	ppm	2	0	0	2	0	2
Nitrogen oxides-Nox -(0% diO2) (4)	mg/kWh	34		45		45	
Available flue pressure	Pa	120		120		120	
Power supply	V	230Vac -50Hz					
Power absorbed	W	40	123	20	130	40	260
Size gas connection	GAS	UNI/ISO/7/1-1»				UNI/ISO/7/1-1/2»	
Size air inlet/exhaust pipes	mm	80/80					
Maximum applicable pressure	Pa	1200					

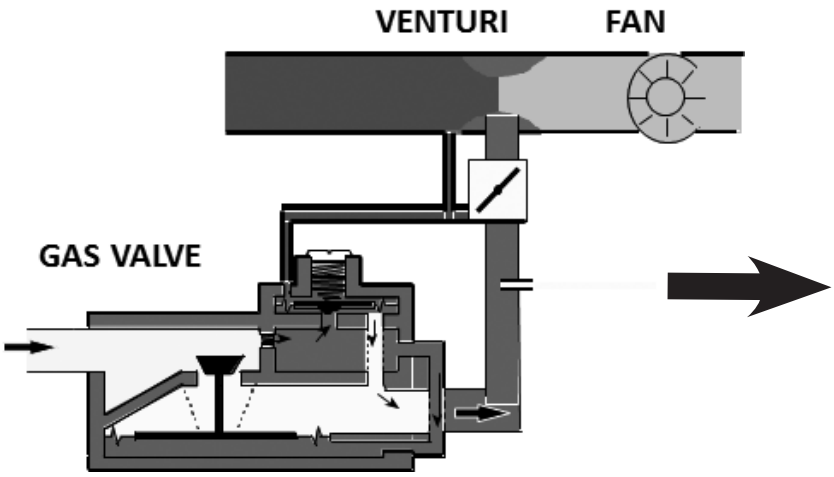
(2) Max. Condensation produced value obtained by test at 30% Nominal load (Qn)

(3) Value reference with gas cat. H (G20)

(4) Vale (statistical medium calculation) EN1020 reference gas cat. H (G20)

General introduction of the PCH

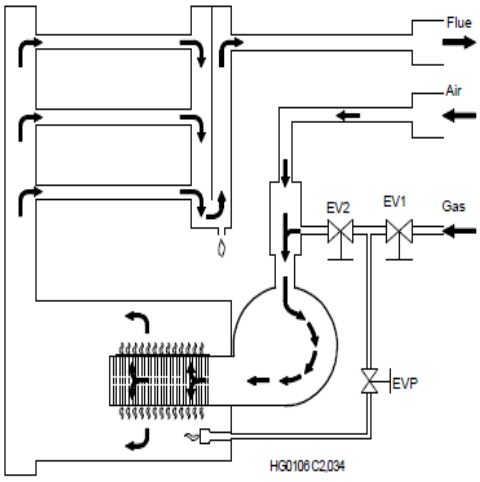
- Premix burner (venturi, gas fan, pilot group, head) gas valve
- Electronic controls with display
- Combustion chamber in stainless steel AISI 430 (AISI 441 in the next future)
- Exchanger bundle in stainless steel AISI 441
- Safety thermostat (and additional probe)

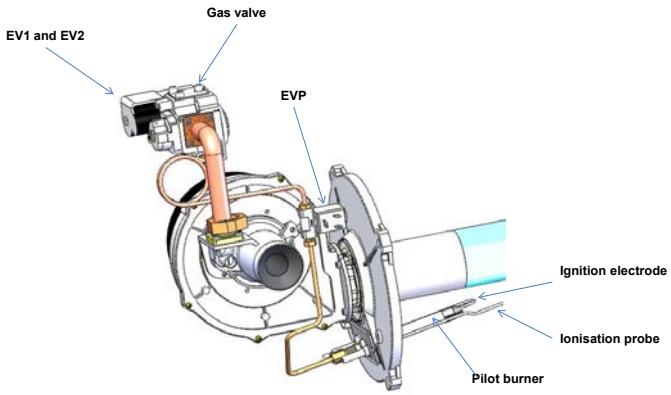


The PREMIX Technology
NO AIR=NO GAS

PCH working cycle

- Heat is Required
- Burner fan starts to pre-wash combustion chamber EV1 and EVP gas valves open to gas feed pilot burner
- Start up electrode gives ignition sparks on pilot burner
- EV2 main gas valve opens to gas feed main burner
- Combustion starts thanks to pilot flame ignition
- The electronic boards close EVP and stops the pilot





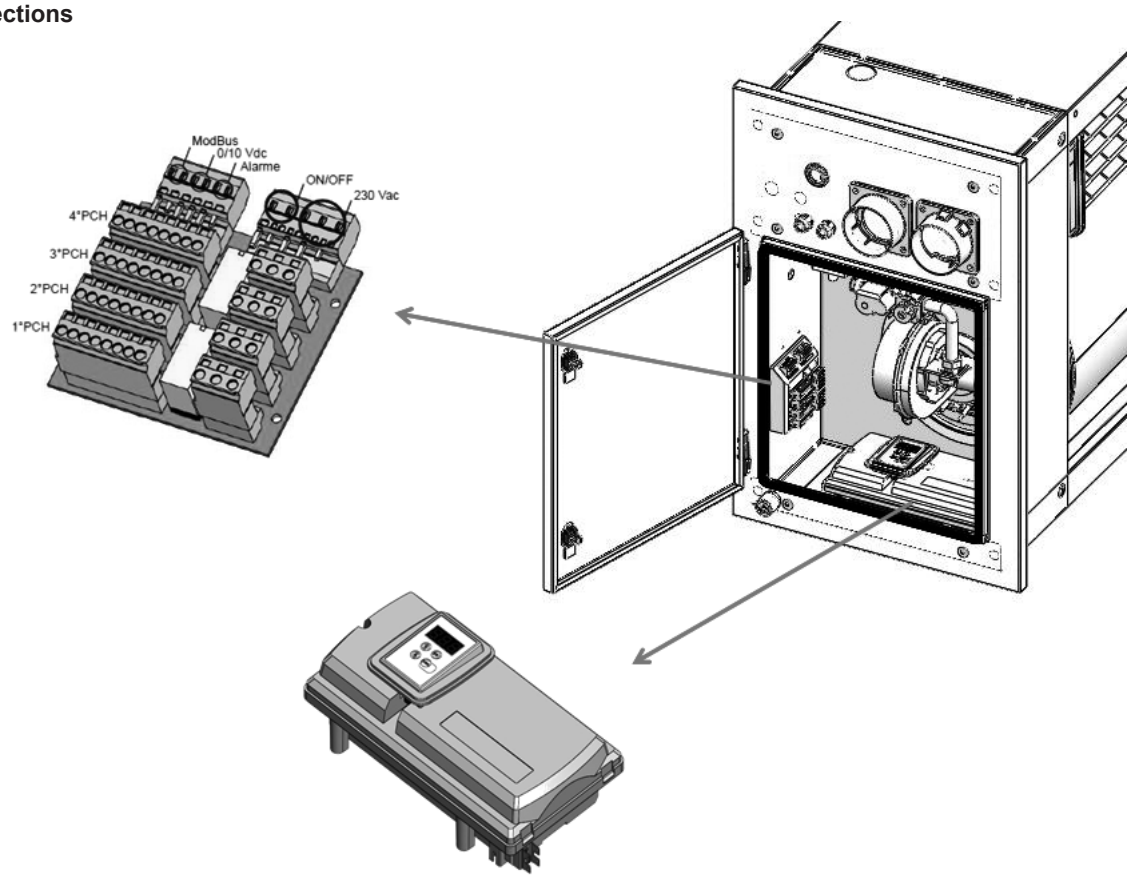
Air fans

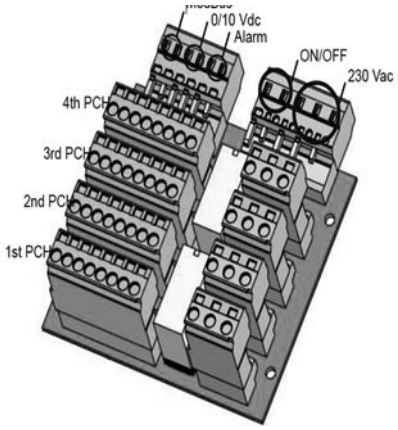
ON delay ≤ 60'' after the burner ON
OFF delay ≥ 180'' after the burner OFF
Possible safety devices of the fans must be connected in series with the burner (ID1/IDC on terminal CN08)

STB and temperature probe

Safety Thermostat STB: it stops the burner at 100°C (manual reset required by Gas Directive)
NTC temperature probe: it forces the burner to modulate (factory set of ST1 = 45°C) or to stop (f.s. of TH1=60) before the STB, automatic reset as soon as the air temperature decreases. Fault F51 recorded.

Connections





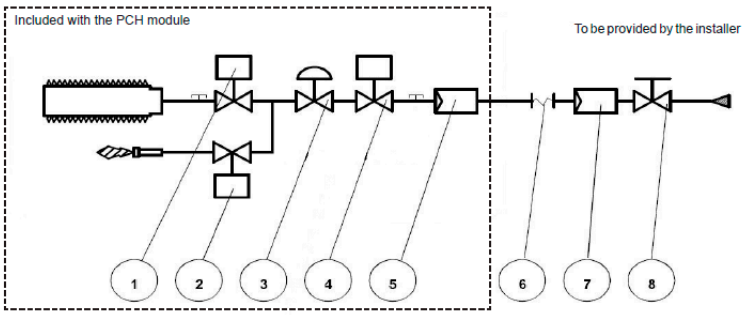
- 1 or 2 gas Supply modules
- Single-phase power supply 230Vac with neutral
- ON/OFF: ok signal to ALL the PCH connected; safety devices must be connected in series to this (fire dampers, fan control, temperature alarms...) in order to protect the system by stopping the burner. 230V supplied. Priority over the power setting signals.
- ALARM: to remote the lock signal; Normally Open (possible Normally Closed)

3 possible power setting modes:

- NTC1 temperature probe (parameter d0=2). Only with 1 PCH; "delivery fixed point" operation; the burner is switched on and off through the ON/OFF.
- **0-10Vdc (d0=5, default factory setting)**
- Modbus (d0=7): modulation board provided with a serial RS485 which may be used to control the burner start-up, the modulation, the alarms, the reset.

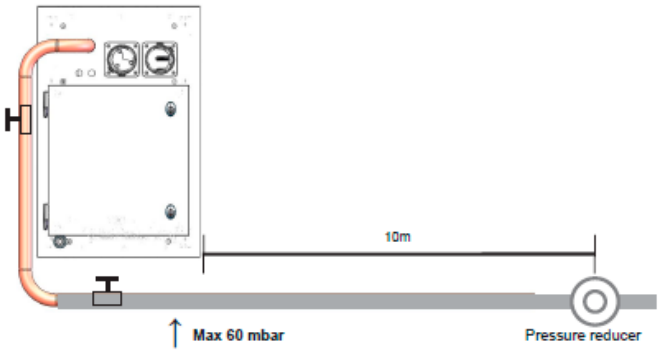
Installation

Gas connection

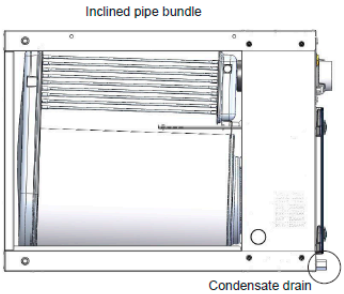


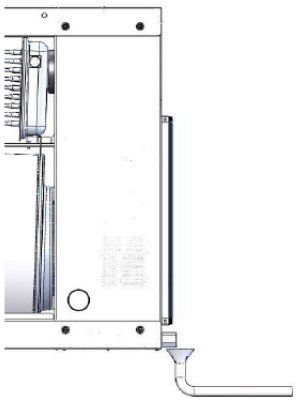
1	Main burner gas solenoid valve
2	Pilot burner gas solenoid valve
3	Pressure stabiliser
4	Safety gas solenoid valve
5	Gas filter (small section)
6	Anti-vibration joint
7	Gas filter (large section)
8	Gas valve

It is strictly prohibited to supply gas to the circuit with pressure higher than 60mbar. Such pressures could cause the valve to break. If pressure are higher than 60mbar, a pressure reducer must be installed at least 10 m away and no pressure stabiliser must be fitted between the pressure reducer and the heater, but leaving the gas filter..

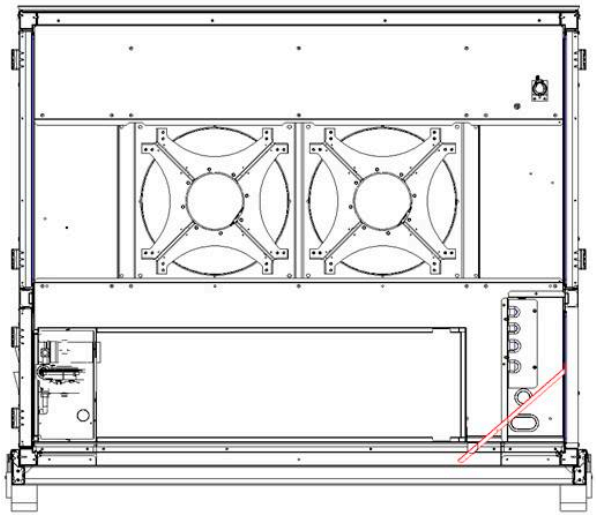


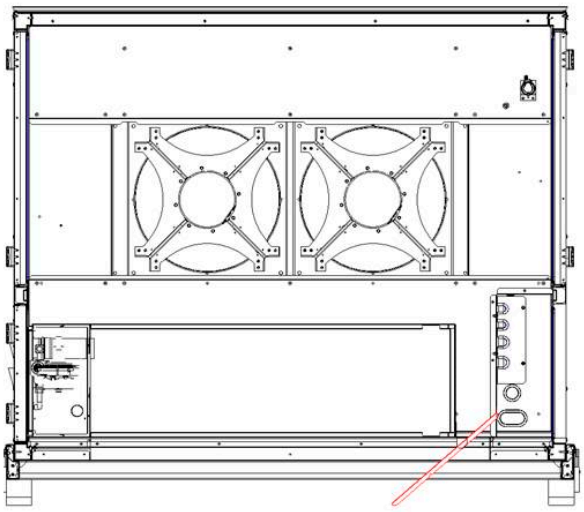
Condensate drain





Supply sensor with PCH vertical: After installation of duct, place the sensor in “running” position.





Starting for the first time

The PCH heater unit is supplied with settings entered and tested for the gas specified on the nameplate. Before turning on the PCH unit, check the following:

- Make sure the gas in the mains corresponds to that for which the PCH is regulated;
- Check, with the pressure intake "IN" on the gas valve, that the pressure entering the valve corresponds to that required for the type of gas being used;
- Check that electrical connections indicated in electrical diagrams attached to the unit;
- Check that efficient earthing connections have been completed, carried out as specified by current safety regulations;
- Provide power to the heater with the general switch on the machine and insert the power plug in the inside of the PCH ..... compartment;

To turn on the heater, follow the instructions below:

- Check that RDY appears on the display. If OFF appears,, use the command, under FUN, to turn the machine to ON;
- Check the LCD display to verify that the Tin value is greater than the Von value.

When ON appears on the LCD display, the heater starts the ignition cycle.

NOTE: Frequently, when turned on for the first time, the pilot burner cannot ignite because there is air in the gas hose. This will block the equipment.
You will need to unblock the equipment and repeat the operation until it ignites.

Analysis of combustion

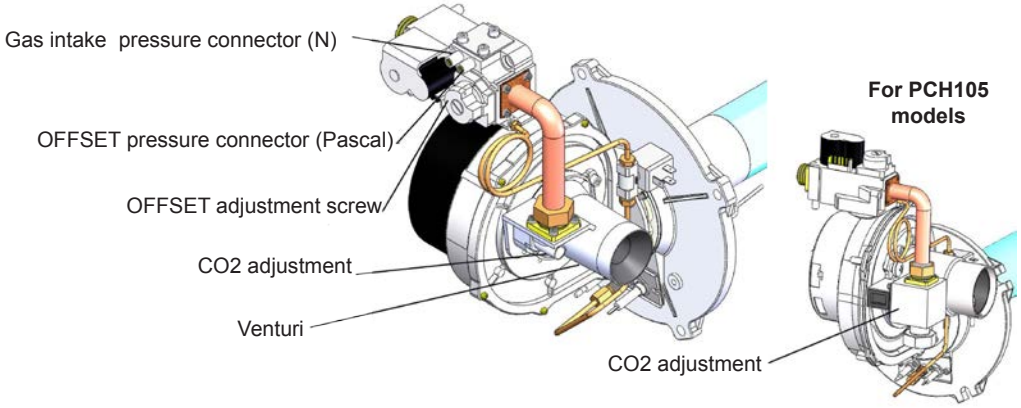
Check that the heater is at maximum or minimum power.

Use the LCD display to reach the REG menu, then use the Hi and Lo commands to force operation at maximum or minimum capacity.

- Check again that the input pressure in the valve corresponds to that required; adjust if necessary.
- Perform the combustion analysis to verify that the level of CO2 corresponds to figures in the tables.
- If the measured value is different, turn the adjustment screw on the venturi. Unscrewing the screw will raise the level of CO2, screwing it down will lower the level.
- Place the heater on minimum capacity, and verify that the level of CO2 corresponds to figures in the tables If the measured value is different, repeat the procedure.

		TYPE OF GAS G20											
		PCH020		PCH034		PCH045		PCH065		PCH080		PCH105	
		min	max	min	max	min	max	min	max	min	max	min	max
Category		according to the country of destination - see reference table											
Air supply pressure	mbar	20 [min 17 / max 25]*											
Ø Pilot nozzle	mm	0,7											
Gas consumption (15°C -1013 mbar)	m^3/h	0,51	2,01	0,80	3,69	0,90	4,66	1,31	6,88	1,74	8,68	1,90	10,58
Carbon dioxide - CO_2 content	%	9,1	8,8	9,1	8,7	9,1	8,7	9,1	8,7	9,1	8,7	9,1	8,5
Fumes temperature	°C	39	113	31	94	30	94	31	86	26,5	70	28	80
Fume mass flow rate (max)	kg/h	31		57		72		107		135		165	
Gas butterly valve	mm	5,8		7,4		7,5		11		12,2		15,8	
Air butterfly valve	mm	Not necessary											

For PCH080 models



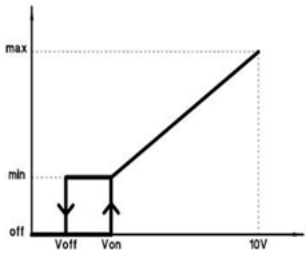
Interface Panel
Status:
rdy the unit is waiting for the ON control and/or the heat demand from the room thermostat (ready - no flame)
ON burner flame or ignition
OFF unit off by a command from the display panel, any heat demands will be ignored
Fxx Fault detected.
Air The EST function in the FUN menu was selected by mistake.
Axx Address of the PCH unit when ≠ Ø (alternating with the operation in progress)
CPU or … flashing: communication problems CPU-SMART/LCD panel

Menus:
3 levels
↑ and ↓ to scroll the menus, ENTER to select,
ESC back to the “unit status" after about 10 minutes
change in the parameter (press ENTER for at least 3’’) signaled by a flash of the display

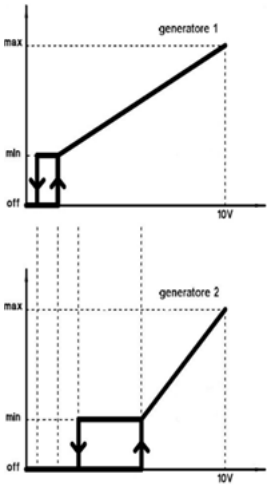
First level menus
Unit status
- FUN to select the function ON, OFF or EST
- REG to force the burner to min or max
- I/O to read values measured by the sensors
- TIN to read the value of the 0/10Vdc signal
- Pra not used;
- ABI to enter the psw to access 2nd and 3rd level

Second level menus
Set to read and set parameters for the 0/10V

Check 0/10 Vdc - D0 = 5			
H51		1	Active only with D0=5 (0/10V) 0=only modulation; 1=modulation and ON/OFF
H52	V	0.5	Voltage of OFF, burner shut down if H51=1: 0÷10 1 Module = 0.5; 2 Modules = 1.5; 3 Modules = 2.5; 4 Modules = 3.5.
H53	V	0.5	Delta Voltage for ignition burner ON 1Module = 0.5; 2Modules = 1.0; 3Modules = 1.5; 4Modules = 1.5.
H54	sec	10	Duration of lower input: 0÷255
H55	sec	10	Duration of upper input: 0÷255

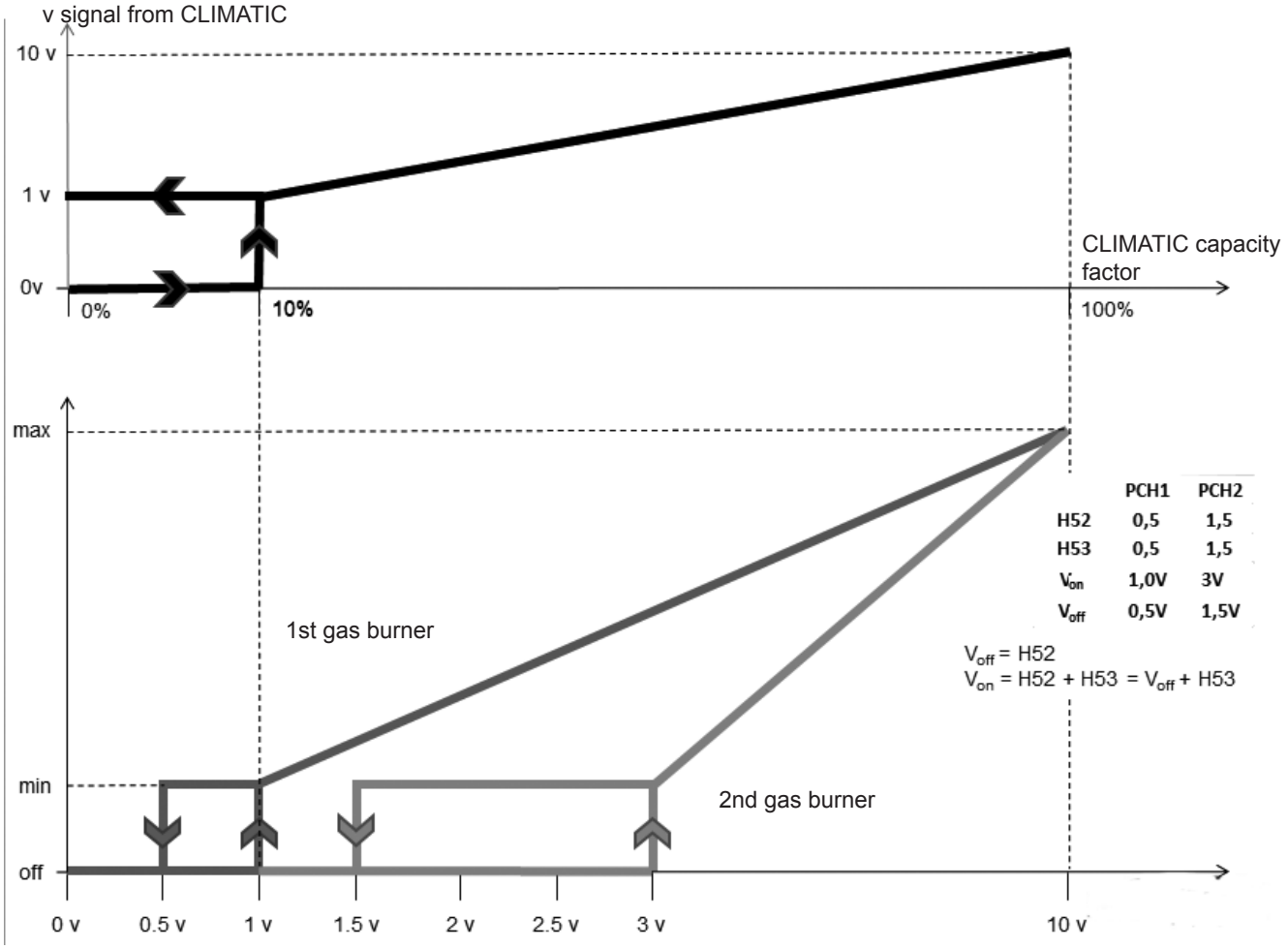


Modulation and ON/OFF
H51=1(factory set)
Voff = H52 = 0,5V (factory set)
Von = H52 + H53 = Voff + H53 = 0,5+0,5 = 1V



	PCH1	PCH2
H52	0,5	1,5
H53	0,5	1,5
V_{on}	1,0V	3V
V_{off}	0,5V	1,5V

See below the relation between signal from eClimatic and PCH



Third level menus

- PAR to read and set parameters for the burner and for the configuration of operation
- FIt to display the fault history

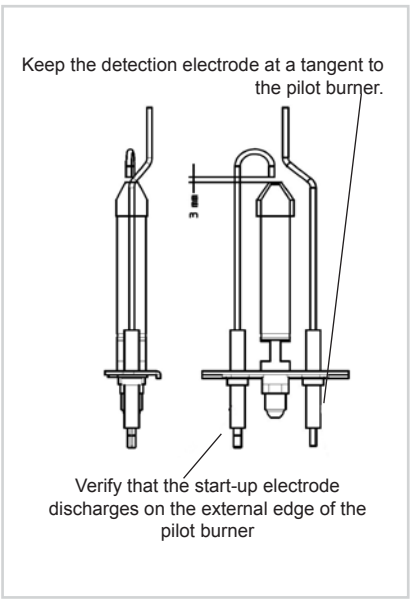
List of faults

FAULT	DESCRIPTION	CAUSE	REMEDY
Blocks caused by Flame - Dependent on the TER equipment			
F10	Failure to ignite flame after 4 attempts performed by the equipment.	• Phase and neutral reversed. • Earth wire not connected. • Phase-phase connection without neutral. • Start-up electrode failed or badly positioned • Detection electrode failed or badly positioned • Detection electrode that moves or disperses to the earthing system when hot. • Low CO_2 value	Manual reset
F11	Ill-timed flame		
F12	Failure of ignition; not visible. The count, displayed in the historical list, indicates whether the heater has had problems with ignition.		
F13	The TER equipment does not accept the reset command from CPU-SMART	TER has finished its 5 reset attempts in the period of 15 minutes.	Wait 15 minutes or use reset button on equipment
F14	Lack of communication between TER equipment and CPU for more than 60 seconds	TER equipment or CPU-SMART PCB broken	Auto-reset
F15	The CPU-SMART PCB sent the ignition signal to the equipment. After 300 seconds, the equipment has not yet lit the flame.	Safety thermostat blocking start up	Check contact closing
		TER equipment broken	Manual reset
F16	Generic equipment block	TER equipment broken	Manual reset
F17	Internal malfunction of TER equipment that does not accept reset command from CPU-SMART	TER equipment broken	Manual reset of equipment
Blocks caused by temperature (safety blocks)			
F20	Intervention of safety thermostat STB	• Excess air temperature due to lack of air circulation • Safety thermostat broken or not connected	Manual reset
F21	Input ID1 open caused by: NOT USED - Jumped	Jump missing ID1 - IDC1	Manual reset of CPU-SMART
Block FAN - burner ventilator			
F30	Fan speed too low in start up phase - VAG	Burner fan broken. FAN electrical cables broken or not connected	Manual reset
F31	Fan speed too high in start up phase - VAG		
F32	Fan speed, during operation, out of minimum and maximum set parameters - VAG		Manual reset, auto- reset after 5 minutes
NTC probes broken or missing			
F41	Probe NTC1 error, air intake tempera- ture	Absence of signal from probe or broken probe	Auto-reset
Over-temperature			
F51	Temperature of the air intake probe NTC1>TH1	• The minimum heat power of the PCH heater module is over-dimensioned compared to the heat power required by the environment. • Check the TH1 parameter - air intake set point.	Auto-reset if NTC1< TH1-15
Check ModBus communication			
F60	Communication error between CPU- SMART PCB and ModBus network, SmartControl or SMART.NET	• •ModBus network is disconnected. • •The address of the PCB is wrong and/or not configured in the ModBus network.	Auto-reset
Lack of voltage			
F75	Lack of voltage during operation cycle (excluding stand-by); the fault is not visible on remote control but only counted.	Lack of electricity during operation	Auto-reset
Internal malfunction of CPU-SMART PCB			
F00	Internal malfunction of CPU-SMART PCB	Perform a manual reset of the PCB; replace the CPU- SMART if the problem persists.	Manual reset

Maintenance operations

To keep the machine in efficient condition and guarantee a long lifetime of the heater, it is advisable to run some inspections every year, before turning it on for the season:

1. check the status of the start-up electrodes, detection electrodes and pilot flame;
2. check the status of fume exhaust and air intake ducts and terminals;
3. check the status of the venturi;
4. check and clean the exchanger and burner are clean;
5. check and clean the water trap
6. check the intake pressure at the gas valve;
7. check the function of the flame monitoring equipment;
8. check the safety thermostat(s);
9. check the ionization current.


Keep the detection electrode at a tangent to the pilot burner.
Verify that the start-up electrode discharges on the external edge of the pilot burner

NOTE: Operations at points 1, 2, 3, 4 and 5 must be performed after disconnecting the heater from the electrical mains and closed the gas intake. Operations at point 6, 7, 8 and 9 must be done with the heater on.

1) Inspection of electrodes

Dismantle the complete pilot flame and use a jet of compressed air to clean the mesh and nozzle. Check the integrity of the ceramic and use sandpaper to remove any oxidation on the metal parts of the electrodes. Check the correct position of the electrodes (see drawing below). It is important that the detection electrode is at a tangent to the head of the pilot and not inside it. The start-up electrode must discharge onto the mesh of the pilot burner.

2) Inspection of fume exhaust and air intake ducts

Visually inspect where possible or examine with specific tools to learn the status of the ducts. Remove dust that forms on the air intake terminal.

3) Inspection and cleaning of the venturi

Remove any dirt at the mouth of the venturi with a brush, and be careful to not let it fall inside the piece.

4) Inspection and cleaning of the exchanger and burner

Perfect combustion in PCH heaters prevents dirt, which is normally caused by bad combustion. It is advisable, therefore, to not clean the exchanger and burner unless there are exceptional circumstances.
An accumulation of dirt inside the exchanger could be revealed by a sizeable variation in the gas capacity that is not caused by improper functioning of the gas valve.
Should it become necessary to clean the burner and/or exchanger, all of the gaskets mounted between the burner and the exchanger must be replaced.

5) Inspection and cleaning of the water trap

Clean the trap every year, and check the connections. Make sure there are no traces of metallic residue. If metallic residue has formed, increase the number of inspections.

6) Inspection of intake gas pressure

Verify that the intake pressure at the valve corresponds to the value required for the type of gas that you are using.
This verification must be done with the heater on at the maximum heat capacity.

7) Inspection of flame monitoring equipment

With the heater operating, close the gas tap and verify that the machine blocks, signalled on the LCD display on the CPU PCB on the machine with code F10. Reopen the gas tap, reset the block and wait for the heater to start back up.

8) Inspection of safety thermostat(s) and air pressure gauges

This procedure must be done with the heater on and the burner lit. Open the thermostat series with an insulated tool [230 V], remove the fast-on from the safety thermostat, wait for the F20 block signal to appear on the LCD display on the CPU PCB on the machine. Reclose the thermostat series, then reset the block.

9) Verify the ionization current.

This procedure can be done directly from the LCD display by entering into the I/O menu. The IOn parameter indicates the value of the ionization current, and the reading is as follows:

- 100, indicates that the value is more than 2 microAmperes, which is plenty for the equipment to function.
- From 0 to 100, indicates a value from 0 to 2 microAmperes; for example, 35 corresponds to 0.7 microAmperes, which is the minimum threshold detectable for the flame monitoring equipment.
- The value of the ionisation current must not be below 2 micro-Amperes. Lower values indicate: the detection electrode in a bad position, an rusted electrode or one about to stop functioning.

Refrigeration

Fault	Possible cause and symptoms	Solution
LP problems and LP cut outs	Refrigerant charge too low	Measure the superheat and sub-cooling: Good if 5°c<sc<10°c and 5°c<sh<10°c Bad if sc>10°c and sh too low Check superheat adjustment and charge unit (a leak check must be carried out)
	In heat pump mode the temperature difference between t outdoor and tevap. (dew) is too high 5°c < delta t < 10°c excellent 10°c < delta t < 15°c acceptable 15°c < delta t < 25°c too high	If too high check the coils are clean or check coil internal pressure drop between the liquid line and the suction line Good if < 3bar Too high if > 3bar (coil blocked)
	Refrigeration circuit blocked in distribution	Stop the fan and create icing of the coil. Check all circuits freeze evenly across the whole surface of the coil If some parts of the coil do not freeze this could indicate a problem with the distribution
	Liquid line drier blocked. High temperature difference between inlet and outlet of the drier	Change filter drier
	Contaminant in the expansion valve	Attempt to free the valve adjusting element by freezing the valve and then heating the thermostatic element. Replace the valve if necessary
	Expansion valve not adjusted properly	Adjust the expansion valve
	Ice plug in the expansion valve.	Heat the main body of the valve. If the LP increases and then decreases gradually, empty the circuit and replace the drier.
	Incorrect insulation of the thermostatic bulb of the expansion valve	Superheat too low: adjust superheat Move the thermostatic element along the pipe Insulate the thermostatic element of the valve
	Low pressure switch cut out point too high	Check the cut out pressure of the low pressure switch: it must be 0,7+/- 0,2bar and must closes at 2,24 +/- 0,2 bar
	LP cut out due to not enough defrost on heat pumps	Adjust the CLIMATIC™ settings to extend the defrost cycles or shorten the time between defrosts
HP problems and HP cut outs	Incorrect airflow rates	Heat pump mode: check the filter before the indoor coil measure and estimate the airflow rate increase the speed of the fan Cooling mode: check the condenser fan (amps)
	Moisture or contaminants in the system	Summer operation Several hours after the unit has stopped, check the correspondence between the measured pressure and the outdoor temperature

Electric heater

Fault	Possible cause and symptoms	Solution
High temperature trip out on electric heater	Low airflow rate	Measure and estimate the airflow and pressure and compare with the specification from customer.
	Incorrect position of the klixon	Check that the klixon, is positioned in the airflow, relocate klixon if necessary Check that there is no heat transfer from the klixon support.

Water leaks

Fault	Possible cause and symptoms	Solution
Water found in the ventilation section	Cooling mode: water carried away from the coil because of excessive airflow and speed on the coil.	Estimate the airflow rate and check the speed is lower than 2,8 m/s
	Low air pressure in the compartment due to a high airflow rate or a high pressure drop before the fan	Check filter Reduce airflow rate
	Check seals around the ventilation section.	Check the door seal Check for the presence of silicone seals in the corners of the door and at the bottom of the refrigeration section bulkhead.
Water ingress in the filter compartment	Water ingress through a leaking fresh air hood or when running 100% fresh air	Check the seals and flanges in the fresh air hood Reduce the airflow rate if necessary

CLIMATIC™ Displays

Fault	Possible cause and symptoms	Solution
Nothing is written on the screen but it's enlightened	Idem	Press on the three right-hand side's buttons at the same time during a few seconds then reconfigure display address setting at 32.
Nothing occurs on the unit or an option disappeared	Possible problem of units' configuration	Check the instructions from 3811 to 3833 and reconfigure options if necessary.
The message "no link" appears	Problem of addresses' recognition	Disconnect the DS from the unit and then reconnect it.
All the units are extinct	Problem main board plan addressing	Disconnect then re-plug; disconnect each unit from the others then change all the plan addresses

Terms and conditions

In the absence of any other written agreement, the guarantee shall only apply to design faults which occur within a 12 month period (warranty period).

The warranty period starts on the date of commissioning and at the latest six months after the delivery of the Rooftop.

Anti-corrosion warranty

10 year warranty terms and conditions for corrosion to the Rooftop casing:

LENNOX shall guarantee the casing of its Rooftop units manufactured since May 1991 against corrosion for 10 years commencing from the date of delivery of the material.

The warranty shall not apply in the following cases:

1. If the corrosion of the casing is caused by external damage to the protective layer such as scratches, projections, abrasion, impacts etc...
2. If the casing is not kept continually clean in the course of maintenance work or by a specialist company,
3. If the casing is not cleaned and maintained in accordance with regulations,
4. If the Rooftop units are installed on a site or in an environment which is known to be corrosive, unless a special protective coating has been applied by the owner for these applications, which has been recommended by a competent body not linked to the owner and after carrying out a study of the site.
5. Nevertheless the LENNOX coating is highly resistant to corrosion, the warranty will not be applied for rooftop installed at less than 1000 m away from the sea

Note: With the exception of the casing, the rest of the machine is covered by the warranty of our general terms of sale.

LenGuard warranty program

Waranty covers:

Parts only: Warranty applies to condenser coils, evaporator coils and hot water coils that would have been treated at the time of order. Warranty covers the repair or replacement of the defect part during the warranty period.

Warranty conditions:

- The above warranty is liable if the start up and periodic maintenance agreement is contracted by a Lennox company or any company accredited by Lennos and if the coils are subject to a visual inspection every other week. In case of appearance of se salt flower a hard treatment should be carried. If there is no need to run such treatment in-between, by default the couils should we cleaned with clear water and pH neutral soap every month. In addition, coils should be cleaned with low pressure steam every 6 months.
- all the periodic maintenance visits will be clearly recorded in the manual delivered with the equipment.

Warranty is void if:

- The equipment has not been commissioned by Lennox or any company agreed by Lennox
- There is no maintenance contract recorded from the date of start-up
- Periodic maintenance visits as stated in our IOM recommentdations are not recorded in the manual delivered with the unit
- Repairs under warranty have not been done by the nearest Lennox representative or any company agreed by Lennox
- The equipment has not been installed, serviced and maintained in accordance with the installation, operation and maintenance instructions
- The equipment is installed in a corrosive environment and adequate protection has not been taken (e.g. adequate coil coating for heavy marine environments)
- The equipment is being used improperly, incorrectly, negligently or not in accordance with its nature and/or purpose.
- Modifications have been made to the equipment without prior written permission by Lennox.
- Settings and protections have been modified without prior written permission by Lennox
- Non-original or other than the prescribed refrigerants or lubricants is used
- The equipment is installed in a country different from the country stated on the invoice.

This warranty does not cover:

- Labour cost for Lennox or non Lennox employees
- Regular maintenance and periodic services
- The replacement of casing parts (panels, screws, etc...)
- The replacement of consumable parts (filters, etc...)
- The replacement of parts other than fans, compressors, air or water heat exchangers.
- Replacements or repairs due to wear, abrasion or corrosion suffered by the equipment or damages resulting from transportation, negligence, failure to provide adequate supervision, lack of maintenance or improper storage conditiions and non-respect of the Seller's recommendations.
- The cost of the time spent on preliminary work or on removal or reinstallation operations made necessary by the particular conditions of use and installation of the equipment (Ex: crane renting cost is out of the warranty coverage)
- Dammage suffered by the hydraulic exchanger as a result of the refrigerated fluid freezing or of the use of an anti-freeze liquid, which does not conform to the Seller's specifications.
- All failures resulting from a defect in parts or materials supplied by the Buyer.
- Tangible or intangible damages (lost profits, loss of products or consumables, or spoilage)
- Damage attributable to acts of God ofr force majeure occurring prior or subsequent to the commissioning of the equipment.

Do not confuse the warranty with maintenance

The warranty will only apply if a maintenance contract has been signed, starting from the date of commissioning, and if the maintenance contract has actually been performed
The maintenance contract must be made with a specialist, competent company.

The sole effect of any repair, modification or replacement of an item during the warranty period must be to extend the material's warranty period.

Maintenance must be carried out in accordance with regulations.

If a spare part is supplied after the expiry of the warranty period, it shall be guaranteed for a period equal to the initial warranty period and will be subject to the same conditions.

We recommend for a contract four inspections per year (every three months), before the start of each season, in order to check the operation of the equipment in the various operating modes.

WARNING: For service and maintenance operations where refrigerant charge has to be removed, assure there is not refrigerant charge in the circuit. Expansion valve is closed when the unit is stopped.

Rooftops are generally placed on the roof but can also be installed in technical rooms. These units are very robust but a minimum regular maintenance is required. Some moving parts in the units can suffer from wear and tear and must be checked regularly (belts). Other parts can get clogged by dirt carried in the air (filters) and must be cleaned or replaced.

These units are designed to produce cooled or heated air through the use of a refrigeration vapour compression system, it is therefore imperative to monitor the refrigeration circuit operating pressures and check the pipe-work for leaks.

The table below, details a possible maintenance plan, including the operations to be carried out and the periodicity at which they must be accomplished. It is recommended to follow such a plan to keep a rooftop unit in good working order. Regular maintenance of your rooftop will extend its operating life and reduce operating faults

Symbols and Legend :

o	Operation which can be carried out by on-site maintenance technicians.
■	Operation which **must** be carried out by qualified refrigeration personnel, trained to operate on this type of equipment.

Note:

- Times are given for information purpose only and may vary depending on the unit size and type of installation.
- Coil cleaning must be carried out by qualified personnel using appropriate methods that won't damage the fins or the tubes.
- It is recommended to keep a minimum stock of common replacement parts in order to be able to carry out regular maintenance operations (i.e. filters). You can contact your local LENNOX representative which can assist you in establishing a parts list for each type of equipment.
- The access ports to the refrigeration circuits MUST be leak checked every time gauges are connected to the service ports.

Task	Operating mode	Monthly	Quarterly	6 monthly	Yearly before winter	Estimated time (min)
Clean or replace filters: Disposable, or metal frame.	Replace filters with new ones if disposable. Vacuum clean or blow the dirt. Wash and dry carefully. Replace media if necessary Blocked filter will reduce the performance of the unit. THE UNIT MUST NOT OPERATE WITHOUT FILTERS	o				30
Visual check of the oil level	Visually check the oil level through the sight glass on the side of the compressor casing	o				2
Centrifugal fan bearings check	Isolate unit from the main power supply; Push the fan wheel manually and check for abnormal noises. Bearings are lubricated for life but may need replacement after 10000 hours	o				10
Check absorbed Amps	Check absorbed Amps on all three phases; compare with the nominal value given in the electrical wiring diagram.		■			15
Check Smoke detector	Start the unit. Trigger the smoke detector by moving a magnet around the detector head. Reset unit and control.		■			5
Check CLIMATIC™ control, set-points and variables	Refer to the commissioning sheet; Check all set points are set according to this document.		■			15
Check clock settings	Check the time and date of the control		o			5
Check the position and tightness of refrigeration components	Check systematically all connections and fixings on the refrigeration circuit. Check for oil traces, eventually a leak test should be conducted. Check operating pressures correspond to the ones indicated on the commissioning sheet		■			30
Check Airflow rate safety switch (if fitted).	Shut down supply fan. The fault must be detected within 5 seconds.			o		
Check freeze protection on hot water coil				■		5

Task	Operating mode	Monthly	Quarterly	6 monthly	Yearly before winter	Estimated time (min)
Check three way valve on hot water coil	Increase room set-point 10°C above the actual room temperature. Check operation of the piston. It must move away from the valve head. Reset the control.			■		5
Check economiser actuator operation	Check all fixings and transmission. Stop the unit using the control. The fresh air damper must close. Start the unit the fresh air damper should open			■		5
Check refrigeration 4way valve	With the unit running in cooling mode increase the room set-point temperature by 10°C. The unit should switch to heat pump mode. Reset the control.			■		5
Check tightness of all electrical connections	Power down the unit and check and tighten all screws, terminal and electric connections, taking a particular attention to the power lines and low voltage control wires			o		30
Check HP / LP safety switches	Install manifold gauges on the circuit to be checked. Shut down the axial fans and wait for the HP switch to shut down the compressor: 29 bar (+1 / -0) auto-reset 22 bar (+ - 0,7) Reconnect fans. Switch off the centrifugal supply fan and wait for the LP switch to cut out: 0.5bar (+ - 0,5) reset 1,5bar (+-0,5).			■		15
Check HP analogic sensor calibration	Install calibrated manifold gauges on the circuit to be checked.				o	30
Check outdoor fans and fan guards	Check the fan blades conditions and all fan guards and protections				o	5
Check position of all sensors	Check the good positioning and operation of all sensors of all sensors. Check the values given in the control system. Replace sensor if necessary				o	5

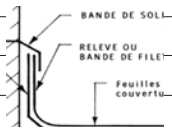
Task	Operating mode	Monthly	Quarterly	6 monthly	Yearly before winter	Estimated time (min)
Check and clean if necessary all fresh air grilles	Check the fresh air grilles (if fitted). If dirty or damaged, remove them from unit and clean with high pressure water cleaner. Refit on unit once clean and dry.				o	5
Clean condensate drain, indoor and outdoor coils (following local regulations)	Visually check the coils for dirt. If not too dirty, cleaning with a light brush may be enough (WARNING: Fins and copper tubes are very fragile! Any damage WILL reduce the performances of the unit). If very dirty, deep industrial cleaning is required using de-greasing agents.(External contractors must be called).				o / ■	1 hour if cleaning
Check electric heater element for excessive corrosion	Isolate the unit; Pull the electric heater out of the heater module box and check the resistances of traces of corrosion; Replace resistance as required;				o	1 hour if replacement
Check anti-vibration mountings, for wear and tear.	Visually check anti-vibration mountings on compressors and centrifugal fan. Replace if damaged.				o	1 hour if replacement
Check refrigeration circuit for traces of acid in the oil	Take a sample of oil from the refrigeration circuit.				■	
Check Glycol concentration in the hot water coil circuit	Check the glycol concentration in the pressurised water circuit. (a concentration of 30% gives a protection down to aprox. -15°C) check the circuit pressure				■	30
Check defrost cycle with 4-way valve inversion.	Switch the unit to heat pump mode. Change the set point to obtain the standard defrost mode and reduce the cycle time to the min value. Check the operation of the defrost cycle.				■	30
Check ignition electrode	Refer to Gas burner section of this installation manual for details				■	15
Check the status of fume exhaust and air intake ducts and terminals	Refer to Gas burner section of this installation manual for details				■	15

Task	Operating mode	Monthly	Quarterly	6 monthly	Yearly before winter	Estimated time (min)
Check the status of the venturi	Refer to Gas burner section of this installation manual for details				■	15
Inspection and cleaning of the exchanger and burner	Refer to Gas burner section of this installation manual for details				■	15
Inspection and cleaning of the water trap	Refer to Gas burner section of this installation manual for details				■	15
Inspection of intake gas pressure	Refer to Gas burner section of this installation manual for details				■	15
Inspection of fame monitoring equipment	Refer to Gas burner section of this installation manual for details				■	15
Check gas fume combustion levels	Refer to local regulation				■	15
Inspection of safety thermostat(s) and air presssure gauges	Refer to Gas burner section of this installation manual for details				■	15
Verify the ionization current	Refer to Gas burner section of this installation manual for details				■	15

Technician	
Date	
Customer	
Site	
Type of access	
Serial number	
Customer reference	

Preliminary checking points	Yes	No
Safe access to the roof		
Safety walkway around the unit		
Dangerous working conditions		
Clear access according to prescription		
Final customer on site		
External damages		

Roofcurb data	Yes	No
Adjustable roofcurb		
Correct waterproffness of the roof edge		
Flashing band installed		
Water drops presence		
Isolation		



Return duct	Yes	No
Return duct		
Changes in the duct that may create additional drops of pressure or turbulences		

Supply duct	Yes	No
Air distribution grilles		
Duct material		

Roofcurb	Yes	No
Level and hight adjustment		
Siphons installed		
Fresh air hood installed		
Type of roofcurb		

Electrical connections	Yes	No
Wiring of main switch		
Wiring of ambient/duct sensor		
Wiring of DC		
Correct wiring for remote terminal		
BMS connection		
Rooftop adress		

Electrical data				
	Circuit 1	Circuit 2	Circuit 3	Circuit 4
Compressor current (A)				
Outdoor fan current (A)				
Electrical heater current (A)				
Electrical pre-heater current (A)				

Operational data		
Working mode	**Cooling**	**Heating**
Supply temperature		
Return temperature		
Outdoor temperature/humidity		

Supply fan			
Mode	%	Nominal current measured (A)	
Nominal current (A)		Fresh airflow (m³/h)	
Extraction fan			
Mode	%	Nominal current measured (A)	
Nominal current (A)		Fresh airflow (m³/h)	

Refrigerant circuit data				
Operating mode	**Cooling**		**Heating**	
	Circuit1	Circuit 2	Circuit 1	Circuit 2
Suction temperature				
Evaporating temperature				
Condensing temperature				
Liquid line temperature				
Backflow/ Return temperature				
Refrigerant (Type/charge)				
Superheating				
Subcooling				
Low pressure safety				
High pressure safety				

Hot water coil			
Inlet water temperature		Outlet water temperature	

Operating checking	Yes	No
3 ways valve		
Air dampers		
Dehumidify system		
Smoke detector		
Remote control		

Climatic setting	
Fresh air percentage	
Cooling set point	
Heating set point	
Airflow setting	
No filter setting	
Dirty filter setting	
Airfow pressostat setting	

General information

Site name:	Serial Number:	
Site address:		
Site operator:		
Cooling load :		
Refrigerant type:	Refrigerant quantity (kg)	
Unit manufacturer	Year of installation	

Refrigerant additions

Date	Engineer	Quantity (kg)	Reason for addition

Refrigerant removal

Date	Engineer	Quantity (kg)	Reason for removal

Leak tests (part 1)

Date	Engineer	Test Result	Follow up action required

Leak tests (part 2)

Date	Engineer	Test Result	Follow up Action Required

Follow up actions

Date	Engineer	Related to test dated	Action taken

Testing of automatic leak detection system (if fitted)

Date	Engineer	Test result	Comments

Refrigerant load according to model size

MODEL	REFRIGERANT CHARGE (Kg)
E014AC045FM1M	15
E014AC055FM1M	15
E014AC060FM1M	15
E019AC061FM1M	16
E014AC065FM1M	15
E019AC066FM1M	16
E014AC075FM1M	37
E019AC076FM1M	34
E016AC085FM1M	37
E019AC086FM1M	34
E016AC105FM1M	28
E019AC106FM1M	36
E019AC124FM1M	36
E022AC077FM1M	23
E024AC078FM1M	23
E022AC087FM1M	23
E024AC088FM1M	23
E022AC107FM1M	23
E024AC108FM1M	23
E022AC125FM1M	30
E024AC126FM1M	40
E022AC140FM1M	30
E024AC141FM1M	40
E027AC160FM1M	40
E027AC180FM1M	40

Comments:

lennoxemeia.com

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CE

Due to Lennox's ongoing commitment to quality, the specifications, ratings and dimensions are subject to change without notice and without incurring liability.
Improper installation, adjustment, alteration, service or maintenance can cause property damage or personal injury. Installation and service must be performed by a qualified installer and servicing agency